

CONTINUATION OF THE
BULLETIN OF THE NUTTALL ORNITHOLOGICAL CLUB

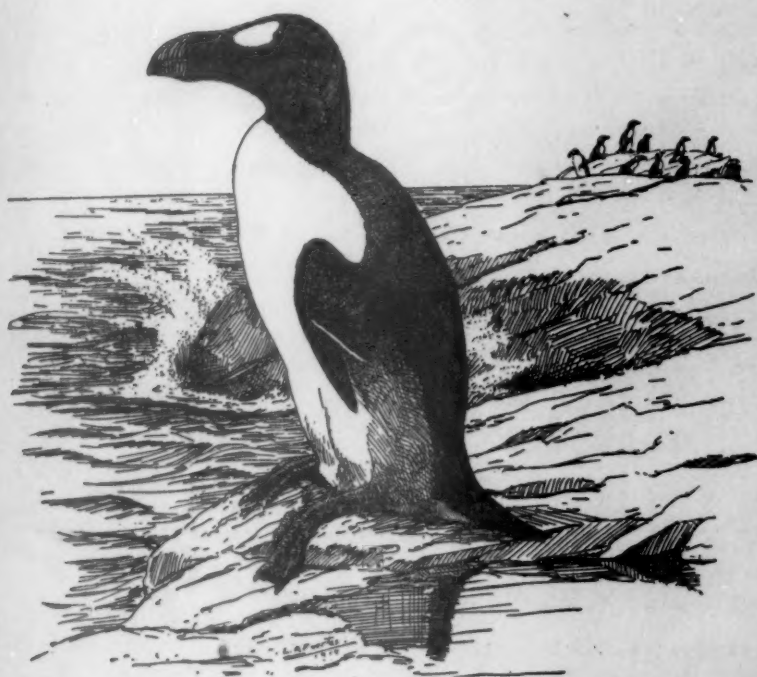
The Auk

A Quarterly Journal of Ornithology

Vol. 61

APRIL, 1944

No. 2



PUBLISHED BY

The American Ornithologists' Union

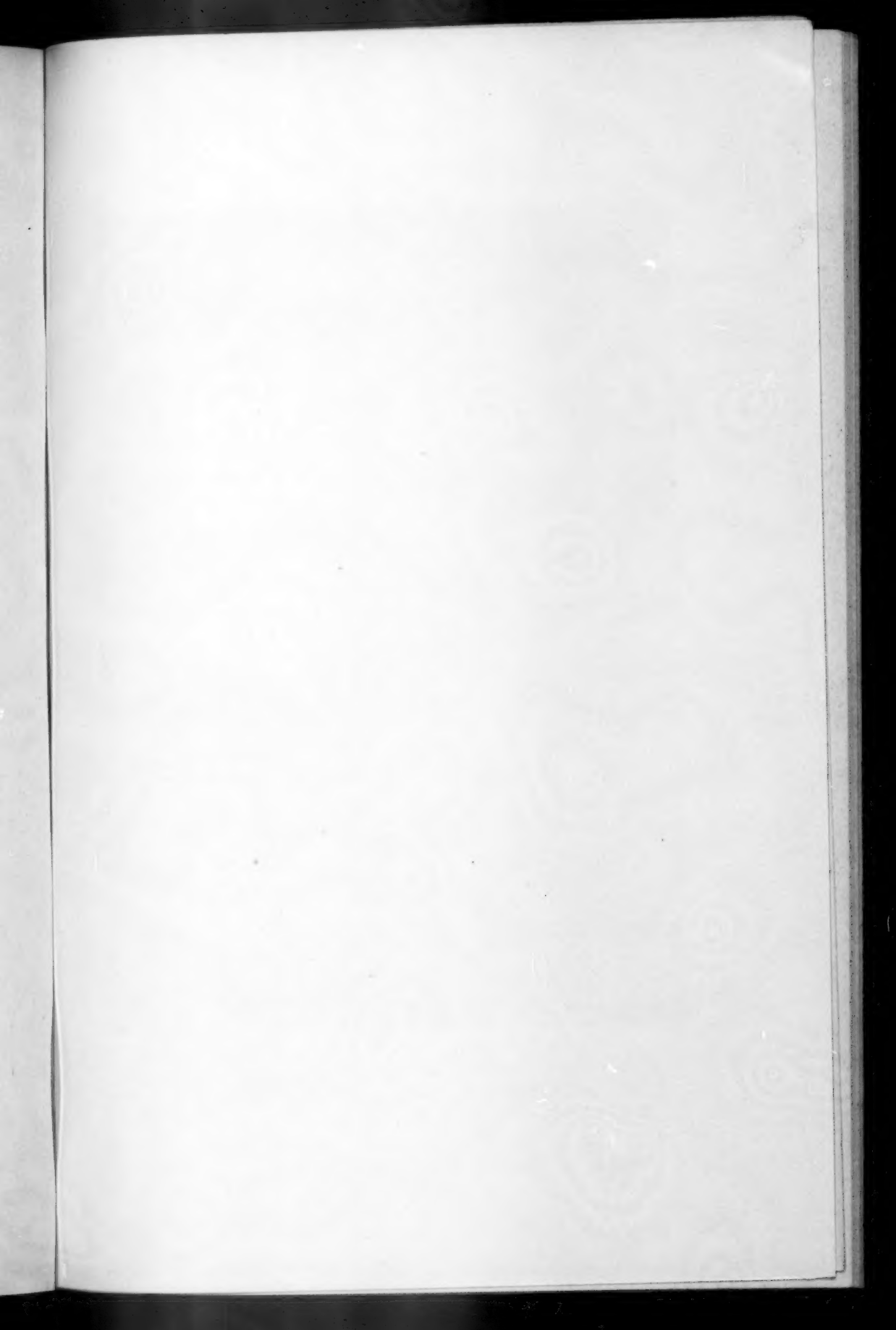
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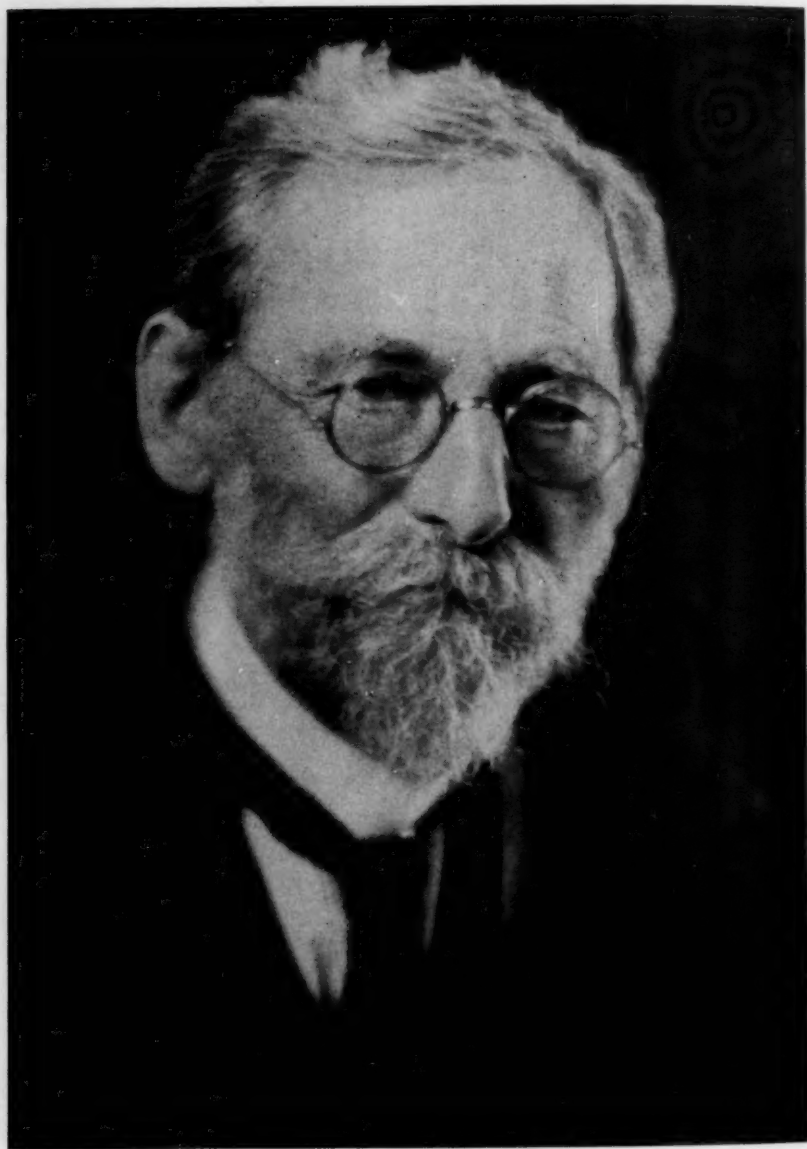
Entered as second-class mail matter in the Post Office at Lancaster, Pa.

Accepted for mailing at special rate of postage provided for in the Act of October 3, 1917, embodied in paragraph 4, section 538, P. L. and R., authorized May 15, 1920.

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Bernhard Stejneger

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LEONHARD STEJNEGER

Bergen, Norway, October 30, 1851—Washington, D. C., February 28, 1943

BY THOMAS BARBOUR

Plate 7

Was it population pressure or was it sheer good fortune that brought Stejneger to the shores of America in 1881? We realize that Scandinavia produces great men and educates them superbly but is not by way of providing first-class opportunities for all of the talented men that are prepared to fill the relatively few positions available to support them.

Moreover, I wish I knew what turned Stejneger from the law to natural history. Not that his juridical studies did not stand him in good stead for they certainly did, but what activated the change? His wide and deep knowledge of both Latin and Greek, to say nothing of most modern tongues, stemmed in part, at least, from his legal training, and his clear-cut thinking, thus trained, enabled him to follow the thread of a troublous nomenclatorial problem more shrewdly and more successfully than any other living man.

Stejneger's deep affection for Spencer Baird was constantly held uppermost in his mind. He was so innately modest that he never realized that he, himself, was by far the greatest discovery that Baird ever made. Nothing so contributed to Baird's great reputation and to the permanent niche he occupies in the grateful remembrance of all students of the history of zoology in North America as the fact that he set Stejneger sailing the seas of natural history in this country. It was Baird who found Stejneger a position in the Signal Corps only a few months after he reached America in May, 1882, and it was Baird who suggested his assignment to Bering Island with what results the world well knows.

One of my most intimate associations with Stejneger was the op-

portunity to study his patience. I played a large part in the somewhat shameful reduction in length of his wonderful manuscript concerning Steller. This had to be brought to a length which was practicable for publication by the Harvard University Press in 1936. Here I had a chance to study the results of his labors. His manuscript, derived often from sources of German written in Russian script, and Russian written in German script, would have baffled the powers of translation of any but the linguistic genius which, in very sooth, Stejneger was. He dedicated the work to Baird, "who sent me on the mission which eventually resulted in this book." How vividly I recall the excellent reviews which appeared in such journals as Petermann's "Geographische Mittheilungen." I think L. S., as we all called him, was a little saddened by the fact that the protean labors which went into the Steller volume never resulted in its appreciation by the reading public. Nevertheless, the most laudatory reviews from the pens of those who counted most made him very happy. I know that one of the everlasting satisfactions of my life was the part which I played in the editing and appearance of this volume. I remember how interested he was in my suggestion that we reproduce a colored plate showing the Blue Jay, copied from Catesby, together with a colored figure of Steller's Jay. These were beautifully drawn by Mr. E. N. Fischer, the staff artist of the Museum of Comparative Zoölogy, to whom we both forgot to give credit when the book appeared. Think of the chance that put Catesby's plate in Steller's hands so that, when he killed the first specimen of the jay that was to be named for him, he held the bird up and declared to Bering, his shipmate in the prevailing mist and fog, that they were in America and no longer in Asia. Alaska had been discovered.

I have elsewhere recalled my tender, personal feelings for Doctor Stejneger (Cf. Copeia, 1931, no. 3; Copeia, 1936, no. 3, p. 178) and all essential biographical features have been splendidly recorded by his lifelong friend, Albert Kenrick Fisher. These notes appeared in Copeia for October of 1943. I am reminded of the fact that the last time I saw Doctor Fisher, in the Cosmos Club in Washington but a short time ago, he told me with great pride that he felt he had saved Stejneger's life in 1890. L. S. had developed a bronchial trouble which Fisher, educated as a physician, felt threatened to lead fast to tuberculosis. On his request, George Brown Goode, then the Assistant Secretary of the Smithsonian, arranged to have Stejneger join C. Hart Merriam in the San Francisco Mountains in Arizona. This trip not only improved Stejneger's physical condition but gave him

his first opportunity for his interest to be aroused by the reptiles of the southwest and we all know how keenly he was interested in the fauna of this region until his death, 53 years later.

Last spring, the first time I visited the National Museum after L. S.'s death, his devoted assistant, Miss Cochran, showed me his exquisite drawings of birds from Bering Island, Japan and Kamchatka which proved that he had indeed a talent which rivaled that of Robert Ridgway as an artist. Had his time not been so completely occupied he would have made a reputation for himself in still another field. I believe very few people know that these drawings exist or that there is any such tangible proof of his first love—the birds.

It is difficult not to be trite and to say the obvious when one attempts to appraise Stejneger or even to set forth his extraordinary versatility and the diversity, range, and depth of his talents and attainments or to attempt to praise the modesty, simplicity, dignity and innate kindliness of his character. He was sparing only in expressing his dislike of unworthy actions or unworthy deeds. To say that he was the greatest naturalist who has ever trod the halls of the Smithsonian Institution is to step on fairly safe ground. To say that he was a great friend, a benefactor, and one who aided hundreds of members of the rising generation of investigators, is sheer understatement. It would take more than the tongues of men and of angels to sing his praise.

Cambridge
Massachusetts

BIRDS' FEAR OF MAN

BY H. R. IVOR

THE following paper is intended to record occasional observations made on certain passerine birds with respect to this display of fear; it is not based on any formal series of experiments. The birds observed were native species, largely individuals either confined in my aviary or fostered there and allowed daily freedom. A few observations concern wild, native birds. I have used the term 'fear' to mean, simply, alarm. More completely the term is defined here as an objective manifestation of the self-preservation instinct, usually displayed by crouching or retreat.

I wish to make grateful acknowledgement to L. L. Snyder, Assistant Director, Royal Ontario Museum of Zoology, for his critical review of this paper.

In May, 1939, a pair of Rose-breasted Grosbeaks (*Hedymeles ludovicianus*), which were aviary conditioned but not held captive, built a nest in the aviary. On May 23, the first egg was deposited, the second on May 24, and the third (and last) on May 25. On the morning of June 6, two nestlings were in the nest. Since neither was hatched on the previous evening (June 5) it is evident that they emerged about the same time, or in quick succession during the night or early morning. At about 6:00 P. M. of June 6 the third egg was observed to be chipped and the bill of the nestling protruded through the shell.

I visited the nest several times on June 13 at which time the two first-hatched young were approximately seven and one-half days old. On my first visits the young evidenced no fear. On a later visit, after a lapse of ten minutes following the previous one, the two older youngsters crouched, but when spoken to, opened their bills for food as did the youngest which had not displayed fear. On several subsequent occasions that day, the two older youngsters crouched in the nest when visited, with the crouch on each succeeding occasion more pronounced. Fear had apparently progressively developed on the eighth day of their life and seemed fully developed by the end of the eighth day. Fear was expressed entirely by the crouch. They did not give vocal evidence of fear even when touched. The youngest in the nest had not yet displayed evidence of fear.

By the morning of the 16th, the two older youngsters, both of which proved to be males, had become accustomed to me and would utter their calls and take food from me as readily as from their parents. The youngest, which proved to be a female, was now approximately nine and one-half days old. When I put my hand near her she sprang 'screaming' from the nest. This was her first manifestation of fear. Fear, apparently had either developed instantaneously or had accrued since my last visit the previous evening at which time she was nine days old.

In this case we have fear becoming manifest in two young males when they were approximately seven and one-half days old, and the expression of fear seeming to show a gradual development of that instinct. In the same nest a young female did not manifest fear until she was nine and one-half days old; her expression of fear seemed to indicate a peak of development when observed.

My second case concerns another family of Rose-breasted Grosbeaks. A pair nested and produced young in June, 1939. On June 15, I observed four nestlings in the nest. Of the oldest two, I knew

one to be eight days old and the other was believed to be a few hours older. I observed that the manifestation of fear by these youngsters was evident on this visit. Observation of their behavior suggested that the expression of fear in their case was only begun.

The bird first hatched was a female; the other three were males. It is evident that the oldest youngsters in the brood under discussion did not first manifest fear until they were twenty-four hours older than the oldest youngsters previously described. There is, then, variation in the age at which fear becomes manifest in a particular species—variation within a brood, and between broods of different parents.

As my third case, I record a typical experience with young Blue Jays (*Cyanocitta cristata*), a species I have observed breeding in my aviary for six years.

In 1934, a pair of Blue Jays hatched two eggs on July 2—one in the morning and one in the afternoon. A third egg hatched on July 3 and a fourth on July 4. Fear began in the two oldest youngsters on July 16 when they were approximately fourteen days old. Fear was evidenced first by slight crouching, a performance which persisted for only a few seconds at a time. On the following day (July 17) fear was much more markedly expressed by a more protracted crouch.

On July 18, only two youngsters remained in the nest—the first-hatched and the third-hatched. The second oldest had disappeared, and the fourth, the youngest and smallest, had died in the nest apparently from starvation. By this time the third-hatched nestling manifested fear strongly. Both the remaining youngsters crouched deeply and the crouch was protracted, but the third-hatched bird expressed fear much more markedly than did the oldest. The latter had become somewhat accustomed to me and apparently its expression of fear was consequently weaker. On my talking to the youngsters for a few moments, fear subsided but it was again evident on each subsequent visit.

On July 21, little fear was exhibited by either of them, as expressed by crouching, but neither of them would accept offered food. Fear was more evident on July 25 and subsequently increased to such an extent that, on August 1, it was not possible to approach either of them closely. Neither of these birds ever showed tameness, and by 'tameness' I do not mean simply tolerance but confidence expressed by such behavior as voluntarily perching and remaining on one's finger. It may be remarked here that both parents were 'finger-tame.'

It seems to be generally understood that the younger a bird is, when it is subjected to close human association, the more readily it is tamed.

My experience does not show that this is always so. There is much individual variation in the susceptibility of birds to become tame; however, it seems obvious that certain species are more susceptible than others.

On July 6, 1938, the writer discovered the nest of a wild Wood Thrush (*Hylocichla mustelina*) in which were three eggs. On July 16, the nest contained three youngsters. Two appeared to be virtually of the same age, a coincidence which seems common enough; i.e., the first two eggs deposited hatch about the same time. These two were judged to be about twenty-four hours old and the third had apparently just hatched.

On July 24, when about nine days old, the two oldest nestlings showed fear. Though its manifestation was not pronounced in either, it was slightly more noticeable in one than in the other. No fear was displayed by the third. I took two nestlings—one which displayed the least development of fear and the youngest which had not displayed fear—to hand-rear them. The elder of the two later proved to be a male and the other a female. Both took food readily and the male, subsequently, never exhibited signs of fear. At about the age when these birds could fend for themselves, the female was observed to display fear for the first time. She is now four years old and, though more or less tame, still shows fear. She will neither accept a mealworm from my fingers nor allow me to approach her closely. The male, which had been taken after fear was displayed in the nest, is one of the most fearless birds I have ever possessed. He does not as much as show fear to humans to whom he is unaccustomed. By way of comparison, I can remark that another female of this species, taken as a nestling before she had displayed fear, displays no fear.

My next case concerns the Bluebird (*Sialia sialis*). Two nestlings, of wild parentage, when taken from a cavity in a willow tree, one on May 22 and the other on May 24, 1938, were each about nine days old. It was impossible to observe the reaction of these youngsters in their natural nesting cavity but they soon took food readily and I detected no signs of fear. Subsequently, when they had developed to the point where I ceased hand-feeding them, fear was displayed. One was released but the other was retained for study. It proved to be a male and in the four and one-half years that I have possessed this bird it has continued to be fearful of me. It will now hesitatingly grasp a piece of food from my fingers but will not permit the close approach of humans strange to it.

Two other nestling Bluebirds of wild parentage were taken from a

bird house in my garden on May 24, 1938. Both showed fear, but this was manifest for only a few minutes after they were obtained and handled. When they were reared to an age where they could fend for themselves, a recurrence of the fear display did not take place. One of these birds, a male, was retained for study. He has never showed signs of fear and will perch on the hand of a stranger as readily as on my own.

Another young Bluebird, in this case a female, showed fear for a few hours after being taken as a nestling, but the reaction ceased and did not return after she had been hand-reared. This individual became very tame.

Still another nestling female Bluebird reared by me never developed fear and became one of those exceedingly rare song-birds which not only submit to being held in one's hand but appear to coax for it. To illustrate the extent to which the fear instinct can be submerged, it may be well to describe the behavior of this individual rather fully.

Each evening at dusk this female would fly to a particular roosting shelf. If I entered the room near the hour of dusk she would often leave her perch and come to nestle in the hollow of my hand—even close her eyes and go to sleep there. On occasion, when I have entered the room after dark, she would still leave her perch and, with difficulty in the gloom, come to rest in my hand. I usually had difficulty in returning her to the roosting shelf. She would cling to my fingers and utter low notes of protest even while her mate was insistently calling her to their roost.

During the spring of 1940 I was absent from the aviary for three months. On my first visit after my return, this female appeared to remember me but she would not perch on my hand. The following day, however, she did so, and even nestled in the hollow of my hand as had been her habit. During my absence she had not attempted this familiarity with persons attending the aviary.

This bird resumed her extraordinary display of fearlessness and a manifestation of attachment to a human. If I were within sight of her at dusk, she would utter her call, and if I entered the room she would fly to my arm, run along it and nestle in my hand. If she had not settled on her shelf for the night she would make repeated trips from my shoulder to the perch where she would seem to settle herself and adjust her wings in the manner of a bird moulding a nest, but if I did not show further attention she would return to my shoulder or hand. If I placed my hand over her on the perch she would remain there quiet and contented.

This individual Bluebird would allow me to take hold of her beak, lift her wings or stroke her without any display of fear or resentment. This unusual behavior toward man apparently did not affect the status of this individual bird among its aviary associates. She was not fearful of the larger birds such as Catbirds, Grosbeaks, and European Blackbirds. The American Robin, the most pugnacious bird in my aviary, showed a decided inclination to avoid her. Although a Brown Thrasher was inclined to attempt domination of this Bluebird, the latter was somewhat indifferent to these attempts. Toward other humans she displayed some fear. When there were strangers near at hand she would not behave toward me as described above, although on one occasion she did nestle in the hand of a human being strange to her—one who was intensely fond of birds.

Her mate of 1942 was so tame that he would perch on the hand of a stranger, yet the two nestlings which this exceedingly tame pair of birds reared in 1942 showed a marked difference in their behavior so far as fear was concerned. When the two were able to leave the nest, the male would not take food from me, but showed considerable fear. The female took food readily. In a few days this behavior was reversed. The male became as tame and fearless as his father, and the female, although willing at six months of age to perch on my hand when food was offered, developed a decided mistrust of me although she had never been handled.

Further evidence as to the extent to which the natural instinct of fear can be suppressed by close association, even in adult birds, is illustrated by my experiences with the Rose-breasted Grosbeak. I have already mentioned, in connection with my remarks on the development of fear in nestlings, two pairs of this species which I have fostered. Both the adult male and female of the first pair were exceedingly tame. When they showed evidence of nesting in 1938 I brought them a supply of twigs. They were highly selective of this material although I attempted to secure for them such as their wild kindred would use. Usually before I could scatter the twigs over the ground for them to choose, both birds would fly to my hand and pick out certain ones. The female would even permit me to assist with nest-building. I could take a twig she had chosen but which was too long for her to handle conveniently and put it in place. The bird would then complete the arrangement.

During the period when I was making observations on the eggs and young, I had no difficulty in lifting her high enough with my finger to allow me to peer at the eggs in the nest. Nor did the female or

the male, while brooding the young, resent being raised so that I could see the nestlings. Neither of the parents later showed alarm when I fed their youngsters in the nest. The male of the second pair was extremely disturbed if I approached the nest; the female, undisturbed. She, however, showed unmistakable evidence of mistrust of my good intentions in feeding her young, even to the extent of taking the food from their mouths.

A further description of the degree of tameness of these Rose-breasted Grosbeaks is offered. They have a habit of standing on my shoulder. In this position they will bite the lobe of my ear. It is my belief that they have associated this performance with food; biting my ear results in my offering them some favored tidbit. One male in particular bites very hard and I am aware that if I do not give him food this behavior does not weaken in the least; it rather becomes intensified.

The male Wood Thrush, mentioned above as one of my most fearless birds, performs in a similar manner. He will take the lobe of my ear in his beak and shake it. This will be continued until he is fed. It is interesting to note that sometimes when this bird, or the male Rose-breasted Grosbeak previously mentioned, becomes rather overly 'enthusiastic' in the ear-lobe performance, I find it necessary for my own comfort to grasp him in my hand and remove him from my shoulder. This handling does not induce the display of fear. He will immediately perch on my finger or return to my shoulder.

An instance can be related of an entire lack of fear in a native species unconditioned by captivity. A pair of House Wrens (*Troglodytes aëdon*) nested in the garden during June, 1940. These birds had not been fostered in any way other than by the provision of a nesting box. When their five young became old enough to reach the entrance of the box, I successfully attempted to feed them insects from my fingers. They displayed no fear. On July 1, they left their nest shelter. The writer and another observer, who was not a regular part of their environment, successfully fed the youngsters from their hands. The parent birds at no time uttered the scolding notes characteristic of the species. Gradually the family of young followed their parents farther afield. We followed and picked up one of the youngsters which perched on my finger and chirped but showed no evident sign of fear. It was fed insects from my fingers. Each of the others was handled in turn. When a finger was put under the breast of any one of these youngsters, it would hop upon it. Not one of the five showed the least sign of fear. With all our handling, photographing, and

feeding of the young, the parents, which remained close at hand, showed no signs of being disturbed.

Most of the instances related in the foregoing account suggest that fear is suppressed, or confidence is established between man and bird, by close and continuous association. But there can be a return or rebirth of fear as a result of abuse or break in the comfortable relationship experienced by the bird.

A pair of Catbirds (*Dumetella carolinensis*) was kept in a compartment of my outdoor aviary. This pair of birds was tame; they could be approached closely and would come to perch on my hand. However, they could not be handled without a display of fear. One morning when I visited the aviary I found that a rat had entered the enclosure and killed several birds. I began at once to cage the remainder. Capture was effected rather hurriedly by the use of a net, not by the usual slow method of a box trap. My method of capture necessitated handling the birds. The Catbirds were greatly disturbed by being caught in this way. Although they were not subsequently disturbed in any way they both showed fear of me, and it was two years before they would perch on my finger. Other species handled in the same way, at the same time, reacted in a variety of ways. In some, handling did not produce fear for longer than the time the birds were imprisoned in the land. Others showed fear for a time but not for long—certainly not for a period as long as that needed by the Catbirds.

One observation which seems worthy of record here is that captive birds seem to focus their attention on the hand of a human associate. I have had birds in my aviary which had never been touched by hands. They had acquired confidence in my person and would allow a close approach. One's head might be bent close toward them without exciting their fear, or one might step about cautiously without any sign of fear being aroused by one's moving feet, but if the hand was extended toward them they distinctly showed fear.

It seems evident from the casual observations reported above that instinctive fear becomes manifest in certain nestling passerine birds at about the age when they are physically capable of leaving the protective environment of the nest. These observations suggest that fear becomes functional by a gradual, yet rapid, development. By continuous and close association with young birds, fear can be inhibited past the nest-leaving stage. There is a tendency for fear to become manifest at a second period, at a slightly later age, when young birds would normally become completely independent. Some individuals can be conditioned to the point where fear of man is almost com-

pletely suppressed, and this may be continued through adulthood. Fear suppressed by conditioning may become manifest to a greater or lesser degree by abuse in handling. Specific and individual variation in the intensity of the display of fear is observable, both in aviary-conditioned and wild birds.

Erindale, Ontario

A MOCKINGBIRD ACQUIRES HIS SONG REPERTORY

BY AMELIA R. LASKEY

MUCH has been written about the song performance of the Mockingbird (*Mimus polyglottos*), particularly its imitations of the songs of other birds. It has also been credited with imitations of many other sounds such as creaking wheelbarrows, human whistles, barnyard poultry, etc. However, diverse opinions exist on the 'imitation' phase of songs of this species. In his review of an article on Mockingbirds, Dr. Witmer Stone (*Auk*, 52: 344, 1935) says: "... we should have welcomed more attention to imitations, as we have always thought that many so-called imitations recorded in print are really not imitations at all."

D. R. Dickey (1922) and J. Paul Visscher (1928) considered that the Mockingbird repertory is inherited rather than mimetic. Visscher, with the aid of Dr. Hoyt Hopkins, listed the more characteristic songs and calls of an exceptionally fine singer, identifying thirty-five like those of other species. He says that only a few of the species listed were common in that section of North Carolina but all occurred on the state list and "since the songs sung by the Mockingbird under observation were not those most commonly heard, since they agree in the main with the songs which are favorites of other Mockingbirds in widely scattered areas, and since there is such great variability in the vocal powers of different individuals, it seems probable that a Mockingbird does not as a rule consciously mimic songs but only possesses an unusually large series of melodies which it calls forth in wonderful perfection . . . but he [the author] only questions if these are 'conscious' and even 'purposive' endeavors, as has been claimed by many writers."

It should not be assumed, however, that individual Mockingbirds have occupied certain areas since birth. Bird-banding records prove there are movements, particularly among first-year birds. My own records, as well as an incomplete list of those on file in Washington, D. C., show recoveries of Mockingbirds at distances of 100 to 270

miles from the place of banding. This would make it possible for an individual to have been associated with many more than the local species and to arrive with a fine repertory already developed.

I have heard free-flying Mockingbirds repeat each other's songs. Observations of a captive Mockingbird, to be described later, indicate there may be 'conscious endeavor' in their singing of songs like those of other species.

Dr. George R. Mayfield (1934), from ten years' observation of about thirty-five individuals around Nashville, says the average Mockingbird has a repertory of imitations of thirty to thirty-five species which includes about 50 different imitations since several songs of some species are noted. He is of the opinion that "the Mockingbird inherits his repertory from many generations back and that from time to time, each individual will pick up some new songs or calls from his environment." On the other hand, Dr. Loye Miller (1938) of California, in charting songs of Western Mockingbirds, notes a low percentage of imitations of other species—only two to eleven per cent. He quotes Dickey (1922) who uses the term "adventitious similarity" as applicable to many of the so-called imitations. Dr. Miller suggests the term "fortuitous similarity" for the songs of the Mockingbird which are similar to those of other species but which he would not classify as true mimesis. He lists ten species whose notes he has recognized with a varying degree of certainty in the songs of a number of Mockingbirds but he considers only three to be true mimesis. He classifies the *klee klee* call of the Sparrow Hawk as given by his Mockingbirds as doubtful mimesis because "too highly pitched." He states that songs sounding like other species are usually given when these other species are neighbors.

Listening to many Mockingbirds, year after year, one learns there are portions of the song that are 'true Mockingbird' song because they are peculiar to that species and are given by all in that part of their range. Interspersed among their own song motifs, one recognizes songs like those of many species but there is considerable variation and individuality in the repertoire of individuals. While three color-banded males about my home were under observation, it was noted that many of their imitations were alike, yet only one used a song like the Yellow-billed Cuckoo. In Nashville's Warner Parks where Phoebe's were common, Mockingbirds in two different places gave perfect 'phoebe' songs, but at home where no Phoebe's nested, that song was never heard. In 'Birds of Oklahoma' (1931), Mrs. Margaret M. Nice says: "Not all Mockingbirds mock by any means,

and of those that do, many have only a limited repertoire . . . the most popular was the Blue Jay . . . the next the Scisstortail and after that the Robin—his scold, *not* his song." She also says that a Mockingbird from the end of the Panhandle mocked six western species that nest in that area.

Observers differ in their attitude toward Mockingbird songs; some incline toward finding models for a majority of the phrases, while others take the more conservative stand of counting as imitations only those phrases markedly unlike the bird's own song and which also resemble known models.

Perhaps mechanical recordings of bird songs and calls will eventually furnish enough material for study and comparison to solve these perplexing questions. In 'Bird Song Study Problems' (1936), A. R. Brand says: ". . . in many instances it is quite impossible to evaluate what a bird's sound-production is by relying on the ear, for the ear is incapable of telling the whole story. Until another medium was found it was quite impossible to make objective studies of bird-song. The medium has now arrived. By adapting the machinery of the sound motion picture, it is possible to photograph bird-sounds. We can record the bird-song on sensitized film, and, after development, have an objective medium of study. There on the film is the picture of the bird-song; with the aid of a low-powered microscope we can study the details of time, pitch, and quality; we can count the vibrations and note the overtones and the relative loudness of the song."

I have been observing a captive Mockingbird that may give some enlightening data on this fascinating problem. At various times I have raised young Mockingbirds to independence and released them; these had been rescued from impending danger. First songs from four of these were heard at 34, 43, 57, and 73 days of age. Another, a male, was kept for further observation and is now nearly four years old. His first song notes were heard at 27 days of age; since his cage was indoors, it is possible that they were detected earlier than the others. Early songs of all were utterly lacking in imitations of other species; they were very soft-toned, similar to the 'whisper' songs of adults, but sounded more primitive. They were given with closed beak. Mr. and Mrs. Harold Michener (1935, p. 138), Pasadena, California, say: "The young birds sing a faint soft song quite without imitations of other bird songs but distinctly a Mockingbird song."

H. C. (for Honey Child), as my hand-raised bird is called, occupies a wire-mesh cage 42 inches long, 14 inches wide and 19 inches high, mounted on a movable table at window-ledge height. The cage is

kept on the screened porch except in winter when it is rolled indoors, but the bird is given periods of freedom almost daily in the house or porch. An attempt has been made to raise him as normally as possible; no effort has been made to train him to do tricks or to make a pet of him. He has no fear of people but resents being caught. He is in beautiful plumage, molts annually, and shows traits very similar to the outdoor birds in the various phases of seasonal behavior.

Notes on his songs reveal some surprising developments and may be of some value in illustrating the way he acquired his repertory. H. C. was one of four nestlings hatched in Percy Warner Park, five miles from our home, about July 23, 1939; he was hand-raised from August 1. On August 4 he left the improvised indoor nest; August 19 he gave his first song notes. Two days later he sang softly with closed beak for ten minutes, a series of almost inarticulate warblings and whistles, hardly audible in the next room. Songs continued daily after August 25 but it was not until September 1 that he sang while I was in the room. Previously he had changed to the begging whine at sight of me. October 29 (aged three months) he sang intermittently from 7:20 P. M. to 10:00 P. M. October 29 and 31 he again sang by moonlight in the otherwise dark room. Since then I have never heard any night singing except in a lighted room.

On November 9, for the first time, his songs contained sounds that reminded me of other species. December 11, when he was four and a half months of age, my notebook says: "H. C. sang much of the day, sometimes in loud tones, again very softly. The songs were interspersed with sounds like the Downy Woodpecker, Carolina Wren, Blue Jay, Catbird's *mew*, Flicker, Cardinal, Starling, Bob-white covey call, and Canary. Songs included whistles, trills, warblings, squawks. His 'imitations' are, excepting the Catbird which left in early October, all of birds he can see or hear from his indoor home. Are these true mimesis or his inherited Mockingbird song with accidental similarities to other species?" During this first song season, household noises, particularly that of the vacuum cleaner, often started his singing.

As spring approached, his songs increased in volume. April 12 notes read: "A varied and indescribable performance; songs are loud and long, starting at 5:30 A. M. (CST), continuing all day. Sometimes they sound like an aviary of chattering birds, sometimes there are whistles like Mr. L. calling the dog and others similar to a mailman's whistle. Songs sounded like Whip-poor-will, Killdeer, Wood Pewee, Cardinal, Carolina Wren, Downy Woodpecker, Crow, Blue Jay, Tufted Titmouse, Flicker, Robin, Starling, Bluebird, House

Sparrow, etc." All these sounds could have been heard by him excepting possibly the Whip-poor-will and Peewee which I cannot explain as these did not appear in my later notes. His songs gradually decreased as the mate-calling period waned. He preceded the outdoor birds in molt; his molt started the last of June. His singing that year was resumed before his new plumage was nearly complete. In July, territory songs were given (a very short, loud, harsh type heard from territory holders in autumn and mentioned by me, 1933, p. 247) and the 'contented,' moderate-toned fall singing started. He became silent in mid-November and, like the outdoor birds in winter, he used the sharp *click*, *chick*, and *chuck* calls morning and evening and at sight of Mockingbirds through the window. No artificial light was used in the room that winter (1940-41) but one previous winter and two later ones when days were lengthened by artificial lighting, some singing prevailed throughout the cold season when Mockingbirds are normally songless.

March 2, 1941, he began the soft singing of early springtime. Within the week his songs contained many of the calls of other birds previously listed. Unmusical sounds were added like the squeak that the washing machine downstairs had developed within the previous two weeks. During the next few weeks he had added more improvisations including Yellow-billed Cuckoo, Bob-white, Yellow-breasted Chat, and alarm call of the Meadowlark, and he was often using the *caw* of distant Crows; this type of Crow call was a common sound just as he had given it. People who heard it, although not familiar with birds' songs, did not fail to remark on his Crow calls. During March a caged young female occasionally joined him in subdued singing. This is the first time I have known of female song in spring. Females sing, however, in autumn.

March 28, 1941, a Cowbird gave its high-pitched song in trees nearby. On March 30, H. C. added an exact replica of that song to his repertory, using it often thereafter.

April 27, 1940, I noted his first 'direct imitation' when he was nine months old. He answered a Tufted Titmouse, giving the *peto* song immediately after it. The same day he answered Mr. Laskey's whistle in kind. These direct imitations continued. My notes contain a number of records for several species which were answered immediately in the same call notes or song each had just uttered: Tufted Titmouse, May 1, 1940, Jan. 27, 1942, Feb. 28, 1942 (three occasions), Mar. 4, 1942 (several), Mar. 5, 1942 (several), Mar. 6, 1942, Apr. 5, 1942, Feb. 27, 1943 (antiphonally); Cardinal, May 1, 1940, June 27,

1941, July 22, 1941, Sept. 22, 1941; Bluebird, May 16, 1940; Carolina Wren, May 17, 1940, Mar. 2, 1942; outdoor Mockingbird, Apr. 4, 1941, Oct. 2, 1941; Flicker, May 2, 1941, June 28, 1941, spring 1942; Blue Jay, June 27, 1941, Feb. 12, 1942 (antiphonally), Feb. 26, 1943; Downy Woodpecker, June 28, 1941, Feb. 27, 1943; Field Sparrow (first part only, never the trill), July 8, 1941 (three occasions), July 22, 1941; Catbird *mew*, July 22, 1941, Sept. 22, 1941; Junco (trill), Feb. 24, 1942; Red-bellied Woodpecker, Feb. 27, 1942; Towhee, spring 1942; Cowbird, Apr. 3, 1942; Canary, spring 1942.

While singing songs with many imitations on March 5, 1942, he carried twigs to the front windows, flying 36 feet, passing through three doorways to get there, where the outdoor pair perched in a tree. This is typical courtship behavior as described by me for outdoor birds (1933). H. C. was courting the female, mate of the male he had fought through the glass each winter since January, 1940, on their artificial territory boundary line. The manifestation of courting behavior was noted first on November 5, 1939, with a 'coaxing' song—a series of softly uttered, choppy, pleasing notes given as he stood with lowered head in a corner of his cage his body tilted forward so that head was down and tail high. The act is suggestive of the coaxing behavior of a cock in the poultry yard, but the Mockingbird never held food. He often grasped a toothpick, twig, or rootlet in his beak. On November 8, he held paper which he then placed in a corner; assuming a squatting position, he turned round and round as if shaping a nest. In his early life these coaxing songs were directed to me but the following year (1941) they were to the young, hand-raised female. At that time he started an animated running back and forth with a twig, singing loudly while wings and tail were spread in plumage display.

During the life of H. C., certain songs have been used for short periods and then dropped from his repertory. *Bob-white*, the whistles, and the washing-machine squeak are examples. While a fledgling Bluebird was being fed for several weeks near his cage, he used the Bluebird's call frequently, but the following spring that phrase was seldom introduced into his performance. In early spring of 1943, however, the Bluebird notes were often used and the washing-machine squeak occasionally. Other songs and calls, including the Yellow-breasted Chat, Crested Flycatcher, Meadowlark, and Goldfinch, appeared from time to time. Yet there were other common birds—Carolina Chickadee, Northern Yellowthroat, Yellow Warbler, and Orchard Oriole—whose songs were never heard in his repertory. If a Mock-

ingbird imitates a Tufted Titmouse, why does it not imitate its close relative, the Chickadee?

Among H. C.'s favorite phrases in 1942, three of the Flicker songs were used very often; several of the birds were around the house constantly in both winter and breeding seasons. On February 27, 1942, an incident occurred which was so unusual that I decided it must have been a coincidence; but when a repetition came a few days later, I was not so sure about 'coincidence' as the explanation. A Flicker flew to the driveway in direct view of the window where I stood beside the Mockingbird cage. As the Flicker started to drink from a tiny puddle in the snow, H. C. gave the *wicka* call. March 1, a Flicker landed in a tree near the same window; H. C. immediately greeted his arrival with several repetitions of *wicka*! At both demonstrations the Flickers were silent and the Mockingbird had not been singing. H. C. is very observant of life about him. Many times a day I can tell when an outdoor Mockingbird arrives within the line of vision of the caged bird, long before my eyes have separated its gray form from the gray trees of winter. H. C. begins his restless hopping but then quiets as soon as the other bird flies out of sight.

June 12, 1942, he sang from dawn at 5:00 A. M. (CWT) until complete darkness at 8:15 P. M., with scarcely any pause during the day. His songs were loud and thickly interspersed with many notes like those of other species. He sang with wide-open beak; sometimes the tips of the mandibles were at least three quarters of an inch apart. In one moment of frenzied performance, he repeated a phrase 106 times in 45 seconds. His ecstatic singing at that late date is comparable to free-flying, unmated males who are still holding territory and advertising their desire for a mate. At noon on June 19, Dr. G. R. Mayfield listened to H. C. for the first time, making notes from 12:10 P. M. to 12:26 P. M. He listed 143 calls or songs of other species, averaging nine imitations per minute, interspersed among H. C.'s own songs. In this lively performance, Dr. Mayfield identified 42 different songs of 24 species. This is a longer list than I had ever recognized, but my knowledge of bird songs is not so comprehensive as Dr. Mayfield's.

H. C., like the free-flying individuals of his kind, uses the food call of young Mockingbirds in his songs, but he has a peculiarity which is probably attributable to his being hand-raised. For a while each summer he reverts to babyhood habits while young birds of other species are being fed near him. He assumes the begging posture and with quivering wings, open beak, and food calls, begs from me.

But instead of waiting to have the food poked into his mouth as the very young do, he takes it in his bill. This behavior occurred in 1940 while I cared for a young Robin and a baby Mockingbird when H. C. was a year old; it happened in 1941 when a young Bluebird occupied the other cage, and again in 1942 when there was a baby Orchard Oriole.

I should like to have apparatus available to make sound pictures of H. C.'s songs for comparison with those of species he seems to imitate. In addition, it would be enlightening to raise other young Mockingbirds and record on sound film the expanding repertory for future study by experts to be sure that, in our interpretations, the ear is not misleading us. Sound film would show whether I actually heard Whip-poor-will and Wood Peewee songs in those early performances of H. C.

In 1924, Dr. Oskar Heinroth published in the *Journal für Ornithologie*, 72: 223-244, the results of his work in raising hundreds of species from babyhood to adulthood, mentioned in a review by Mrs. Nice (1935). He says that in the case of very simple songs, the song is inborn in the bird. With other birds, song must be learned. If raised alone, they do not sing like their wild fellows, and no one would guess their species from their song; but in the spring, if they hear one of their own species, they quickly learn the proper song.

SUMMARY

A male Mockingbird, hand-raised from nine days of age, gave first musical notes at 27 days of age and sang a ten-minute 'whisper' song when 29 days old, similar to adult song but without imitations. At three months he sang three evenings by moonlight but never afterward. When four and one-half months old, songs like those of other species were identified and later other sounds were recognized. In April, 1940, when nine months old, he started 'answering' outdoor birds in the same call or song each had just uttered; many more were noted thereafter, including Tufted Titmouse, Cardinal, Blue Jay, outdoor Mockingbird, and others. Twice he greeted the arrival of Flickers near his window with Flicker calls although they were silent. His repertory was gradually enlarged, but some songs were only temporary acquisitions while others were used intermittently. Imitation was clear in the acquirement of much of his repertory.

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NESTING OF THE TURKEY VULTURE IN OHIO CAVES

BY VICTOR COLES

Plate 8

ALTHOUGH birds as a whole exhibit distinct differences in nest construction as influenced by their habits and the available material, there is a marked likeness within individual species in the selection of nesting sites regardless of the habitat in which they may be. The Turkey Vulture (*Cathartes aura septentrionalis*), in contrast, presents a diversified selection of nesting sites. One finds it nesting on the sides of steep cliffs as well as down in swamps, and it may be found in rocky caves or rugged hillsides or hidden in salt marshes. It places its nests in forests, shrub thickets, along water courses, in old and odd structures, and in various curious places. In fact, as Burns (1924) expressed it: "The Turkey Vulture nests indifferently in hollow trees, logs, moss crevices, and under thick coverts or in abandoned buildings remote and darkened."

In order to gain intimate knowledge of the nesting habits of the Turkey Vulture, the author spent the spring and summer of 1936, 1937, and 1938 in the central part of Ohio in what is known as the

Sugar Grove Region. From the standpoint of the ornithologist this section is of especial interest because of the great number of vultures which collect there. Furthermore, because of the large number of birds and the rather unique physiography of the country, this spot is a favorable one for a life-history study. The above-mentioned locality comprises the greater portion of Fairfield and Hocking counties, Ohio, the topography of which resembles somewhat that of the hill country found in many parts of southwestern Ohio and much of West Virginia. The Sugar Grove Region is peculiar in that it is crossed by numerous deep ravines, giving a total relief from 200 to 400 feet. These ravines are often V- or U-shaped, being about a quarter to half a mile from the open to the closed end. The mouths of these valleys may also be as much as two or three miles across, but usually not more than several hundred yards. The sides are wooded, sloping up from the bottom to a distance of nearly 500 yards and crowned with erect cliffs of heavy sandstone intermingled with layers of clay rising abruptly from 50 to 200 feet. Due to weathering, the numerous cliffs are cut up with many fissures, varying from a crevice to a small gorge. It is within these recesses or caves that the nests of the Turkey Vulture are to be found.

Many hours were consumed in making a thorough search of every conceivable hollow within the rocks. The importance of securing early nesting dates was realized, together with the desire for definite knowledge of the appearance of the first egg. Sixteen nests in all were discovered in the spring of 1936. During the seasons of 1937 and 1938, all nesting sites previously discovered were closely scrutinized in order to ascertain reoccupancy and consequent egg laying. The additional search revealed four more nests.

The search for the various nests brought to light two paramount facts: first, that there are certain types of cavities selected by the birds; secondly, the birds recognize a distinct territory in which the nest is located. Regardless of the length of the valley, not more than one nest on any one side of a valley was ever discovered. Should the valley be U-shaped or should it be large and contain several apparently ideal sites, it is then possible that one nest may be found on each side of the valley or one at one side and one at one end. Intensive search in all valleys in the seasons of 1936, 1937, and 1938 failed to reveal any deviation from this rule. Thus it is apparent that, at least in this region, there is not only a total lack of gregarious nesting, but a well established territory surrounding each nest.

TYPES OF NESTING CAVES AT SUGAR GROVE

Type I.—Type I seems to be most frequently sought by the bird and such sites are rarely unoccupied. It is in a cave within the rocks from 100 to 200 feet above the floor of the valley and about ten to twenty feet up in the rocky sides. The better-constructed caves have two entrances, one used by the old birds as an easy entrance and a quick exit and the other used by the young to pass out to a platform or to the top of the cliff to be fed, to stretch, to preen, and eventually to take off into the air. The opening used by the adults is about four feet square, seldom less, while that used by the young is much smaller. The interior of the cave is dry. Oftentimes a large rock, perhaps dislodged from above, serves as a windbreak and a shelter from the rain. At times, the floor of the cave may be heavily lined with leaves, chestnut and oak predominating. Frequently the roof of the cave touches the incubating bird. At this place, far removed from the heat and light of the sun, the temperature will be as low as 15.5 degrees Centigrade (60 degrees Fahrenheit). The light intensity at high noon seldom exceeds three candlepower.

Type II.—Type II may assume a variety of forms but it will always be found within the cliffs. Sometimes the nest is located in a long, narrow fissure so small that one can scarcely wedge one's way back to the eggs. These recesses are dark, damp, and forbidding places where the air is stale. Such nests are less desirable, perhaps, because they have but one opening, thereby preventing rapid escape in time of danger.

Type III.—Type III is frequently encountered under the shelves of rock from which the soil has been removed by weathering or by rodents. Although the eggs are usually not more than two feet from the entrance, the hollow itself may extend back several feet. So small are these sites when measured vertically that as the bird sits upon the eggs the roof of rock touches its body. There is an abundance of such sites and many nests are found in such positions.

From the viewpoint of inaccessibility and isolation, Type I is more desirable but less frequently encountered. Photographs of these sites are shown on Plate 8.

TEMPERATURE AND LIGHT RATINGS WITHIN NESTS

Below are shown the temperature and light ratings within six nests. It will be seen that the average high temperature was 17.6° C. and the low, 15.7° C. The average light intensity was 2.3 candlepower as measured by a Weston meter. It is, perhaps, this low temperature

within the caves that is in part responsible for the long incubation period of forty days common to the birds of the Sugar Grove Region.

TABLE 1
MEASUREMENTS OF TEMPERATURE AND LIGHT WITHIN NESTS

Temperature		Light
High	Low	Candlepower
15.5° C.	15.0° C.	4
18.8	15.5	2
15.5	13.3	2
16.1	15.5	2
16.2	14.4	2
23.8	20.5	3
<hr/>		<hr/>
Average	17.6	15.7
		2.5

NEST MAKING

In the selection of a nesting site the Turkey Vulture exhibits more care than it shows in nest making. A mere depression among leaves, crumbling bark, dirt, or rubbish serves to form a repository for the two handsome eggs. At the sixteen nests under observation during the spring and summer of 1936, 1937, and 1938 the writer never saw any indication of nest building. In all the nesting sites there was always some material covering the bare sandstone rock. In most cases this was dead, dry leaves which had drifted down from the trees above or had been swirled in by the rushing winds of the past years. In the early part of the nesting season there may not have been even a slight depression to suggest a proper nest, but during successive days of incubation, the weight of the bird's body tended to press or push aside the debris until a shallow, bowl-like depression was made within the leaves.

Some of the nesting sites serve as the winter home of the wood rat (*Neotoma pennsylvanica*). These animals frequently carry into the cave vast quantities of materials such as twigs, leaves, bits of bark, husks of corn, chestnut burrs, string, and paper to serve as food, nesting material, and as a windbreak. Even when such an aggregation of rubbish is present the bird does not use the debris on which to lay its eggs, but will deposit them on a spot where accumulated materials are thin and scant. Two nests were found where the only substance separating the eggs from the stone was a very slight layer of what could be classed as humus. It was undoubtedly the remains of plant material reduced to soil through successive years. In both these nesting caves bare, loose rocks of various sizes dotted the floor. In the

spring of 1934, a nest was located in a secluded and darkened corner of a barn loft. In this case, although some twenty feet off the ground, the bird had chosen the floor boards as a repository for the eggs rather than some of the numerous elevations within easy reach, such as piles of hay, platforms, and coils of rope.

Thus, it is apparent that, although nest-building material may be available in unlimited quantities and varieties, the Turkey Vulture builds no nest. However, the word 'nest' will be used in this discussion, hereafter, to designate the repository of the eggs.

EGGS

Position of the eggs within the nest.—In my investigations I found the eggs of the Turkey Vulture deposited in the darkest part of the cave, which was nearly always behind a rock or under an overhanging shelf or at a point where there was just enough room into which the bird could squeeze. The eggs were deposited from two to six feet within the cave. The original position of the eggs was changed from time to time, and due to the movements of the bird the eggs would become rather deeply embedded among the leaves. However, the next day would again find them on the surface. There was at no time any evidence of an attempt on the part of the bird to conceal the eggs when it left the nest.

Number of eggs.—The usual number of eggs deposited in the nest of the Turkey Vulture is two, sometimes one, and as a survey of the literature discloses, at rare times three eggs have been found.

Time of egg laying.—My earliest record in Central Ohio for the laying of the eggs is April 8. This is in accord with Jones (1886) who stated that in Ohio the eggs are laid about the first week of April to the fifteenth day.

Time between laying of two eggs.—In all nests which the writer observed, the interval between the laying of the first and second eggs was one day; but only in three cases was it possible to observe this. Presumably, incubation began as soon as the set of eggs was complete.

Description of eggs.—The eggs vary in shape from ovate to elliptical and from ovate to elongate ovate. The shell is smooth, dull, and grayish white, and sometimes has a faint bluish or greenish tinge. The eggs are blotched, splashed, and smeared with shades of deep chocolate brown which colors usually predominate over the larger end. Pale lilac markings are discernible over the egg and likewise are more numerous at the larger end. There is always a distinct difference in the color patterns of the two eggs in a set. Usually the first one laid

is the more heavily figured with brown, while the other is more evenly speckled with smaller splashes of chocolate.

In my experience there was no great change in the color of these eggs during incubation; however, they seemed to become dull and lose their luster at this time, due perhaps to the deposit of oil from the brooding bird's breast.

TABLE 2
WEIGHTS AND MEASUREMENTS OF TURKEY VULTURE EGGS
(SUGAR GROVE REGION)

<i>Weight</i>	<i>Length</i>	<i>Circumference</i>
67.6 grams	68.65 mm.	44.84 mm.
74.4	71.43	44.84
92.6	71.83	49.21
89.1	73.42	49.60
87.3	73.81	48.02
86.6	71.83	46.83
86.4	75.40	48.41
87.5	72.23	49.21
81.1	69.05	48.41
80.8	70.24	48.41
83.0	68.65	47.22
80.7	67.07	47.62
85.4	71.43	48.02
71.2	66.67	46.83
77.7	74.21	46.83
Average	70.06	47.62

INCUBATION

Beginning and duration.—There is a considerable variance in the estimation of the length of the incubation period. The shortest number of days revealed in the literature was twenty-two days, as reported by Gentry (1882). Thirty-two days was recorded by Audubon (1835). Thirty days was mentioned by Burns (1915), Jackson (1903), and Kempton (1927). Pennock in writing to Bent (1937) estimated the incubating period to be forty-one days.

It is interesting to note that, although the first two nests located by the writer in the season of 1936 had their full complement of two eggs at the time of discovery, these eggs did not hatch out until thirty-nine days later. During the season of 1937 the beginning of the incubation period was noted in four nests. In order to get further data upon this, the second egg was taken and placed beneath a hen. Since this egg failed to hatch in forty-five days, it was opened and found to be infertile. The nest from which this egg was taken was deserted,



(Upper left), TURKEY VULTURE INCUBATING IN A BARN. (Lower left), 'TYPE I' NESTING SITE. (Upper right), 'TYPE II' NESTING SITE. (Middle right), TURKEY VULTURE NEST IN CAVE AT SUGAR GROVE, OHIO. (Lower right), TURKEY VULTURE EGGS, SHOWING PATTERN AND SIZE (COMPARED TO A HALF-DOLLAR).

as also was another of the four nests I discovered. The eggs in the third nest, unfortunately, found their way into the hands of a collector. One egg in the fourth nest proved to be infertile while the other egg hatched in thirty-nine days. It is the opinion of the writer, therefore, that the incubation period of the Turkey Vulture is between thirty-eight and forty days in this region of Ohio.

Sex of incubating bird.—Opinions differ regarding the part played by both birds in incubation. Audubon (1835) believed that both birds shared this duty. Kempton (1927), Maslowski (1934), and Gentry (1882) agreed with him in this belief. Horsfall (1932), nevertheless, stated that only the female sat upon the eggs. The writer succeeded in banding eight birds at four nests and proved conclusively that both birds aided in the incubation. Sufficient observation to determine how much time was spent by each bird upon the nest was prevented by the extreme timidity of the birds as well as by the placement of the nest so high above the ground and so far back in the cave. In two nests the adult birds were marked in the hope that this would prove helpful in securing the desired information. The expected results did not materialize as both nests were at once deserted.

Behavior of incubating birds.—The attitude of the adult birds, when approached during incubation, differs with individual birds and types of caves selected. In the larger caves where the exit is easy and where there is a double entrance, the adult usually makes its escape. This is almost universally so at the beginning of the incubation period. In the case of the smaller caves, there is little chance for the bird to take to the air when an intruder has reached the entrance; consequently it may retire to the deeper, darker recesses of the cave, blundering off with the head lowered, mouth open, and feathers ruffled. Or the bird may remain on the nest, slowly lift its wings, emit a prolonged, deep guttural hiss and, at the same time, vomit. There is either a slow discharge in the form of a solid mass of food or a steady drivel of colored liquids. This method of slow regurgitation is probably the result of the crouched, sitting position of the bird where lack of room prevents it from throwing the head forward, then sideways, and lifting the body, which is the normal action in the vomiting process. This discharged material never remains in the nest but is re-eaten after the intruder disappears.

Food is sometimes regurgitated as the birds fly from the nests when disturbed. This usually occurs a few seconds after the bird is in the air, due perhaps to the rapid contraction of the muscles as the bird hastily escapes. This discharged material is always merely dropped and at no time ever directed at an intruder.

There is a total lack of pugnacity on the part of the brooding vultures. Repeatedly, when I entered the caves, taking with me the equipment necessary to band and make measurements of eggs and birds, I have met with no interference on the part of the incubating bird or its mate. I have found, however, that after the birds have once been handled while upon the nest, considerable scheming is required to catch them on the eggs again. When a Turkey Vulture's nest is being inspected, the mate of the incubating bird will often be perched on some high, dead tree nearby, commanding a view of the nesting site. I could not ascertain if any signal or warning, vocal or otherwise, was exchanged between the birds. At times I observed that it was impossible to catch the bird on the nest if its mate was soaring overhead. When the mate was not seen, it was easier to approach the nest and handle the bird.

Even when incubation was at its height there were two periods of the day when both birds usually were absent from the vicinity of the nest. The first was in the morning about the time when the vulture population of the valley was engaged in sunning itself or taking exercise flight preparatory to the morning search for food. The second period was in the afternoon when the day's hunt was over and the birds were preening and sunning themselves before entering the roosting area. Not infrequently I have seen birds approach the nesting territory just before dark, after they had apparently been engaged in these activities.

Conditions at the nest while incubating.—Oftentimes the only indications of a Turkey Vulture's nest is the slight evidence of excrement on some prominent rock at the entrance of the cave. Since the adult frequently pauses upon a rocky platform when leaving the nest, such platforms can usually be detected from above by traces of excrement which is in no case abundant. At times, however, it is possible to detect the presence of a nest by the peculiar odor of the vulture. This must not be confused with the odor of carrion or filth, for the bird has definitely a musty smell which is not altogether unpleasant. Even birds reared in captivity and fed on strictly fresh meat emit the same odor.

In most of the nests located, interior conditions depended much on the type of the cave. The very nature and construction of the recesses, which were large and roomlike and well ventilated, aided much in their sanitation; the circulation of air tended to carry off any disagreeable odors present. In contrast to this, there were small, narrow, lengthy, fissured caves where interchange of air was infrequent and in consequence such places were stale and musty.

I have seldom encountered excrement or or near Turkey Vulture eggs. Occasionally, feathers or down from the adults may be found within the caves. No refuse, no bones, nor any animal remains were ever discovered inside the nesting caves. Generally speaking, when one considers the feeding habits of these birds as well as their size, together with the fact that caves as a whole are dark, forbidding places, Turkey Vultures' nests in caves before and after the arrival of the young are by no means objectionable. The nests which I have seen in logs or stumps exhibit the same sanitary conditions.

SUMMARY

This paper has attempted to reveal certain facts hitherto not generally known concerning the Turkey Vulture. No evidence of gregarious nesting was found in the Sugar Grove Region of Ohio. A distinct territory surrounded each nest. Characteristic nesting sites in caves are described. Both male and female birds took part in incubation while the length of the incubation period was thirty-eight to forty days. One day elapsed between the laying of the first and second eggs. The low temperature within the caves no doubt increased the length of the incubation period. Conditions of comparative cleanliness surrounded the nests which made working with these birds a pleasure rather than an obnoxious task.

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SEXUAL DIMORPHISM IN THE FALCONIFORMES

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It has been known for a long time that the males of certain species of Falconiformes are smaller, sometimes much smaller, than the females. This fact has been common knowledge but apparently there has never been any careful work to determine in which species and to what degree this dimorphism is exhibited. The present work is intended to fill this gap in ornithological information.

Sexual dimorphism is exhibited in a majority of orders of birds, and in most cases the male sex is the larger. This is the case in all groups for which data are available, except the Falconiformes, the Strigiformes, and the Superfamily Charadriodea (Shore-birds) of the Charadriiformes, where the opposite is true. The similarity of the Strigiformes to the Falconiformes in this respect might have been developed because of the similarity of habits, but this theory cannot be carried too far because the equally predacious Laniidae (Shrikes) of the Passeriformes show the opposite dimorphism. The presence of the Charadriodea here is harder to explain; perhaps they are following the pattern of the rest of the Charadriiformes in which the sex most concerned with incubating and brooding is the smaller, for in this superfamily, the males take on most of the nest duties,¹ a habit most highly developed in the Phalaropodidae.

The amount of size difference between the sexes in birds can be demonstrated most easily by the ratio of the size of one sex to that of the other. This gives a series of percentages showing the size differential. From the percentages, more information may be deduced.

The most accurate measurement of the 'size' of a bird is, most naturally, that of weight. However, there are practically no data on weights of hawks. What exist are taken largely from birds which have been in captivity for considerable lengths of time for the purpose

¹ This statement is open to question. There is much evidence that in most of the shorebirds, both sexes incubate. Cf. Ticehurst, *Ibis*, (13) 1: 582-583, 1951.—Ed.

of falconry. It can not be assumed that these birds were in their natural physical condition. Such data on wild birds as are available check fairly closely with the information deduced from the measurements of skins. Unfortunately, few collectors have been in the habit of recording the weights of their freshly killed specimens.

Since insufficient material on weights is at hand, it has been necessary to devise some suitable substitute with measurements that could be taken from the large number of study skins that have been available. Four measurements were found to be suitable. These were, of necessity, linear measurements, so, since weight varies as the cube of linear dimensions, the average of each measurement for each sex was cubed and a percentage was taken of the relation of the male to the female. Thus, a value of 100% means that, for that measurement, the male is the same size as the female, whereas one of 50% means that the male is half the size of the female. Since these percentages have no relation to each other, they can not be averaged to get a single value for that species. The separate parts must be considered separately.

The measurements found to be most practical were the folded wing, the tail, the tarsus, and the bill. Certain other measurements, such as the total length and maximum circumference, were found to depend in study specimens entirely on the preparation of the skin. Therefore, no confidence could be placed in such figures and they were neither taken nor used in this study. All measurements were taken with a straight edge or dividers so that the chord, rather than the arc, of any curved structure was recorded.

A total of over 2,300 specimens of North American hawks was measured in the collections of the Museum of Comparative Zoölogy, Cambridge, Mass.; the Boston Society of Natural History, Boston, Mass.; and the American Museum of Natural History, New York, N. Y. A small number of these measurements were discarded for reasons shortly to be mentioned and the rest (2,259) were used to determine the averages from which following percentages were derived.

The measurements of certain specimens were disregarded for one or other of the following reasons: (1) that the sex was not indicated on the original label; (2) that the bird was molting so that true figures on the lengths of wing and tail could not be obtained; and (3) that the measurements did not fit into the normal range for that sex of that species—i.e., that a mistake had been made in the determination of the sex of that bird.

Here follows a table of the ratio of the measurements of the male

TABLE 1
PERCENTAGES OF MALE TO FEMALE MEASUREMENTS

Species	Wing	Tail	Tarsus	Bill
<i>Cathartes aura septentrionalis</i>	96.0%	102.0%	99.4%	103.5%
<i>Coragyps atratus atratus</i>	95.7	87.5	91.5	87.2
<i>Gymnogyps californianus</i>	108.0	91.5	121.0	104.0
<i>Elanus leucurus majusculus</i>	101.0	100.5	111.0	113.5
<i>Elanoides f. forficatus</i>	96.7	94.0	94.5	98.5
<i>Ictinia mississippiensis</i>	94.0	100.2	97.5	93.0
<i>Rostrhamus sociabilis plumbeus</i>	92.5	94.0	90.0	113.0
<i>Astur a. atricapillus</i>	77.5	66.0	89.5	73.5
<i>Astur a. striatulus</i>	80.0	63.0	75.5	79.5
<i>Accipiter v. velox</i>	60.2	68.8	71.4	56.2
<i>Accipiter cooperi</i>	66.8	66.8	71.0	55.5
<i>Buteo b. borealis</i>	83.0	80.7	85.5	81.2
<i>Buteo b. umbrinus</i>	76.2	74.5	84.8	63.5
<i>Buteo b. hrideri</i>	85.0	83.5	80.5	77.0
<i>Buteo b. calurus</i>	84.7	90.5	96.0	78.5
<i>Buteo b. harlani</i>	78.5	79.0	87.0	75.0
<i>Buteo l. lineatus</i>	86.0	83.0	92.8	81.0
<i>Buteo l. alleni</i>	86.3	84.5	95.0	76.2
<i>Buteo l. extimus</i>	81.2	80.8	90.0	79.4
<i>Buteo l. texanus</i>	83.5	90.0	93.5	80.5
<i>Buteo l. elegans</i>	83.3	77.5	80.0	84.2
<i>Buteo p. platypterus</i>	91.0	85.8	97.5	83.8
<i>Buteo swainsoni</i>	82.5	86.7	79.2	76.2
<i>Buteo albonotatus</i>	78.0	86.5	87.0	69.0
<i>Buteo albicaudatus hypospodius</i>	91.2	90.0	93.5	82.5
<i>Buteo brachyurus</i>	83.0	85.5	98.5	71.2
<i>Buteo lagopus s. johannis</i>	86.5	87.0	97.5	75.5
<i>Buteo regalis</i>	84.3	90.2	85.4	70.0
<i>Parabuteo unicinctus harrisi</i>	72.5	82.5	82.5	76.5
<i>Asturina plagiata plagiata</i>	74.5	72.5	87.2	79.0
<i>Urubitinga a. anthracina</i>	85.0	82.0	95.0	87.5
<i>Aquila chrysaetos canadensis</i>	94.5	85.0	92.0	90.0
<i>Haliaeetus leucocephalus alascanus</i>	85.0	84.0	91.5	83.3
<i>Haliaeetus l. leucocephalus</i>	76.0	74.0	131.5	71.5
<i>Circus hudsonius</i>	73.5	70.0	73.5	65.0
<i>Pandion haliaetus carolinensis</i>	86.5	77.5	92.0	81.5
<i>Polyborus cheriway auduboni</i>	87.0	81.8	93.0	85.5
<i>Falco rusticolus ssp.</i>	76.4	67.6	80.8	74.5
<i>Falco mexicanus</i>	77.8	74.9	77.0	71.5
<i>Falco peregrinus anatum</i>	66.2	57.0	72.0	61.0
<i>Falco p. pealei</i>	68.0	63.5	69.5	50.0
<i>Falco fusco-coerulescens septentrionalis</i>	71.0	74.8	97.5	61.0
<i>Falco c. columbarius</i>	76.5	79.0	81.5	63.5
<i>Falco c. suckleyi</i>	73.2	72.0	71.0	70.0
<i>Falco c. richardsoni</i>	76.2	73.2	77.8	62.2
<i>Falco c. bendirei</i>	72.0	70.8	79.0	66.8
<i>Falco s. sparverius</i>	85.5	66.0	107.5	88.0
<i>Falco s. phalaena</i>	88.0	91.0	102.0	95.5
<i>Falco s. paulus</i>	84.6	84.5	89.6	82.0

to those of the female in each of the four characters chosen. The classification and sequence of the fourth edition (1931) of the A. O. U. Check-List is used throughout, and all subspecies, with the exception of those of the Gyrfalcons (*Falco rusticolus*), are treated individually.

On the basis of these percentages, the birds involved can be divided into three general groups: (1) those in which the male is practically as large as the female; (2) those in which there is only a moderate size difference; and (3) those in which the male is much smaller than the female.

The first group, rather arbitrarily chosen, includes:

Cathartes a. septentrionalis
Coragyps a. atratus
Gymnogyphs californianus
Elanus l. majusculus
Elanoides f. forficatus

Ictinia mississippiensis
Rostrhamus s. plumbeus
Aquila c. canadensis
Falco s. phalaena

The third group contains:

Astur a. atricapillus
Astur a. striatulus
Accipiter v. velox
Accipiter cooperi
Buteo b. umbrinus
Buteo b. harlani
Asturina p. plagiata
Haliaeetus l. leucocephalus

Circus hudsonius
Falco rusticolus subsp.
Falco mexicanus
Falco p. anatum
Falco p. pealei
Falco f-c. septentrionalis
Falco c. columbarius and subspecies

All other species fall into the second group.

On superficial examination of these lists, it would seem that the birds which inhabit a climate with more severe seasonal variations show a more marked sexual dimorphism. A closer inspection shows that this is not true; the Golden Eagle of Group I is distinctly northern in distribution, the Aplomado Falcon of Group III is unquestionably subtropical, and certain tropical *Accipiters*, namely *A. fringilloides*, *chionogaster*, and *salvini* show fully as great or even greater size difference than does their temperate representative, *A. v. velox*. Thus, climate alone may be ruled out as the factor causing this dimorphism in size.

Various differences in habits, activities, and the like seem to be correlated with the amount of size difference. It would seem, from data included in life histories, that those species in which the male is much smaller than the female show: (1) the female somewhat more active than the male; (2) a larger average set of eggs; (3) a somewhat shorter incubation period; and (4) a somewhat shorter period between the hatching and the fledging of the young. There are no data giving

any indication whether these characteristics are the cause of the sexual dimorphism or the result of it. Nevertheless, they may bear investigation.

Throughout the species of Group I, both sexes apparently share nearly equally the tasks of nest building, incubating, guarding, and feeding the young. The Golden Eagle is the only possible exception; here the male does slightly less incubating and more hunting, and in this respect approaches the habits of the species of Group III.

In Group III, on the other hand, the female, in many cases, takes on much of this activity herself. After building most of the nest, the female often does most of the incubation while the male guards the nest and brings food for her and for the young after they are hatched; the male may feed the young directly or may surrender the food to the female who then feeds them. This general arrangement is found in the Goshawk, the Marsh Hawk, the Gyrfalcons, the Prairie Falcon, the Duck Hawk, and the Pigeon Hawk and its subspecies. The other species of this group do not show this increase of activity of the female to so great an extent, though nowhere is there such equality as in Group I.

The number of eggs found in a set in Group I averages two. The exceptions to this are the California Condor which lays only one egg about every other year and the White-tailed and Everglade Kites which lay three or four eggs yearly. The birds of Group III never lay less than two eggs in a clutch (and that only in the case of *Haliaeetus l. leucocephalus*) and may lay as many as five or six; the average is four or five. The Duck Hawk lays four or five eggs, whereas in Group I, the Mississippi Kite, a bird only slightly smaller than the Duck Hawk, lays only one or two.

The number of eggs laid by any species is supposed to be an indication of the degree of difficulty to be anticipated in the rearing of a brood. It is hard to see why birds nesting in similar situations in the same area should have to meet apparently drastically different conditions. Yet, this seems to be the case very often; Cooper's and Sharp-shinned Hawks, which lay four or five eggs, breed throughout the southern states, whereas the Mississippi and Swallow-tailed Kites, which breed, or formerly bred, in the same areas, lay only two. It would almost seem that the number of eggs in a set is more characteristic of the general group with which the bird is classified than of the ecological conditions of the breeding area.

As regards the incubation and fledging periods, again the birds of Group III hold the advantage. The bird is immobilized and ex-

posed to danger for a shorter time during the incubation period and the young are able to get out and shift for themselves earlier, so that there is a scattering of the resources and a greater chance for survival of any one nestling. Here again, equally successful birds that are found together have entirely different reproductive time schedules. For instance, the Marsh Hawk incubates for twenty-five days and broods for five weeks, whereas the Black Vulture sits for thirty days and the young remain in the nest from ten to fourteen weeks.

To be sure, there is some correlation between the length of time of incubation and of brooding and the size of the egg, and hence the size of the bird involved. In Group III, however, the size of the egg in proportion to the size of the bird is clearly and definitely related to the taxonomic group rather than to any possible size difference between the sexes. The correlation between the size of the egg and the time of incubation may be pertinent to some extent, but it does not explain the difference in the case of birds that are more or less of the same size, such as the medium-sized falcons and the kites. Here there is something more than just the size of the bird.

One further striking feature will be noticed on comparative examination of the percentages of size in each species; as a general rule, the tarsus of the male is nearer equal in size to that of the female than are most of the other measurements. This fact could be predicted because both the male and the female capture and eat the same food, and in the hawks, the talons are the principal weapons of offence. Thus, for the birds to hunt together for the same prey, the apparatus for the capture of that prey must be more or less equal, even though they, themselves, are of considerably different bulk.

This proposition may be carried on still further and it may be said that the size difference came about by a decrease on the part of the male rather than an increase in the size of the female. The more primitive members of the Falconiformes show less size difference between the sexes so it is probably logical to assume that the ancestral forms of the higher groups likewise showed little or none. Now if the male should, for some reason, begin to decrease in bulk, the legs must stay large in proportion to the rest of the bird if, to put it teleologically, the two sexes are to continue to eat the same food. The other possibility is that the female happened to grow larger and the male, in order to eat the same food, had to grow also, but he accomplished his purpose by merely getting larger feet! It must be assumed throughout that the two sexes eat the same food, because if they live on separate diets, the food supplies can vary independently and it might be that one region could not support both sexes.

CONCLUSIONS

(1) The amount of sexual dimorphism in the Falconiformes varies from the Cathartidae, in which the male is practically of the same size as the female, to the Falconinae and the Accipitriinae, in which the male may be only two-thirds the size of the female.

(2) There is no apparent reason for this difference in the life histories of the birds concerned. The extent of this dimorphism is more characteristic of the taxonomic position than of the environment of the individual species.

(3) There are indications (tarsal measurements) that this dimorphism has come about by a decrease in the size of the male, and, therefore, that the sexes of the ancestors of the Falconiformes were equal in size. This conclusion is further suggested by the fact that the more primitive members of the order show less dimorphism than do the more advanced forms.

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AVIAN SPARE YOLK AND ITS ASSIMILATION

BY ALEXIS L. ROMANOFF

It is well known that at the time of hatching a bird still retains a portion of unassimilated yolk material. About two days before the embryo is ready to be hatched, a rapid growth and unfolding of the tissues at the umbilicus cause that portion of the yolk which has as yet not been absorbed to be enclosed within the abdominal cavity. After enclosure of the yolk, its utilization goes on as before until, under normal conditions, it has been entirely absorbed. Since the yolk sac is actually a diverticulum of the small intestine, its material is absorbed directly from the sac into the blood stream. The spare yolk, in this manner, is able to supply the developing chick with a store of nutriment which enables it to survive for a limited period after hatching without an additional supply of food.

The rate of assimilation of the spare yolk has been studied primarily in the chick (Virchow, 1891; Iljin, 1917; Schilling and Bleecker, 1928; Parker, 1929; Jull and Heywang, 1930; Romanoff and Romanoff, 1933; Romanoff, 1943; and Fronda, Banez, and Monegas, 1937). Very little is known about the absorption of yolk in other species of birds as well as about changes in its chemical composition following hatching. For this reason the work was extended to include several species of birds and chemical changes in the yolk which, it was thought, might indicate preferential absorption of certain food material.

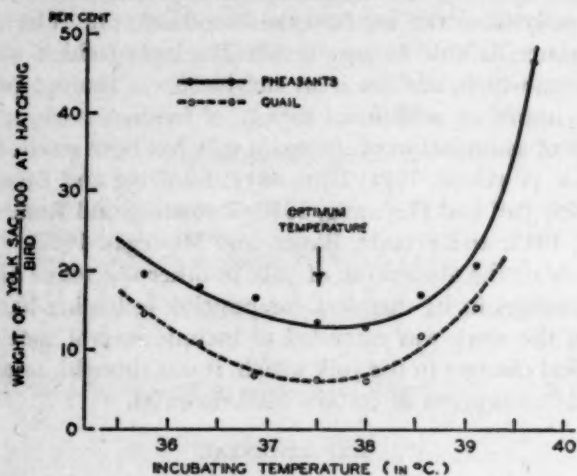
EXPERIMENTAL

Amounts of spare yolk in various species.—In the newly hatched chick the amount of unassimilated yolk material has been variously determined by Iljin (1917) at hatching as 8.19 gms., by Virchow (1891) at 12 hours as 5.34 gms., and by Parker (1929) and Jull and Heywang (1930) at 24 hours as 4.41 gms. and 5.86 gms., respectively. In observations by the author the average yolk-sac weight immediately after hatching was 6.16 gms. in Leghorn and 7.25 gms. in Brahma chicks.

The amount of spare yolk found at hatching in various species of birds is given in Table 1. The weight of the yolk sac varied closely with the weight of the bird. It also varied consistently with the original egg weight; the larger the egg, the heavier the yolk sac. On the other hand, the percentage of yolk weight to bird weight did not show such consistent variation. In general the smaller birds had a lower percentage of yolk weight than the larger birds, the values extending from ten to nearly twenty-five per cent.

The weight of unabsorbed yolk at hatching may vary not only with the species, but also with the idiosyncrasy of the individual, and probably with a number of other factors.

Influence of incubating temperature.—Perhaps the most important external factor influencing the amount of unabsorbed yolk in birds at hatching is temperature. In pheasants and quail (Romanoff, 1934), continued exposure to both high and low incubating temperatures, ranging from 35.5° to 39.5° C., resulted in considerable retention of yolk—the greater the deviation in temperature from the optimum of 37.5° C. the larger the amount of yolk retained (Text-figure 1). At high temperatures

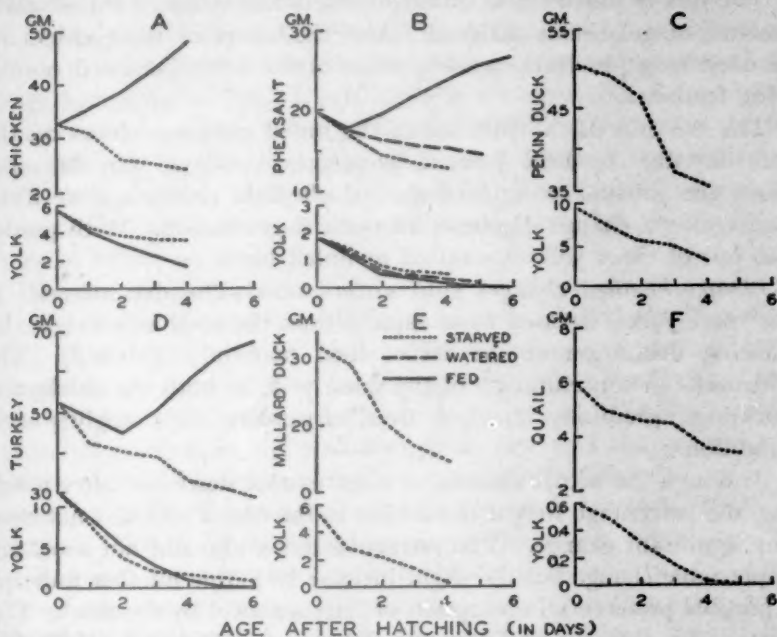


TEXT-FIGURE 1.—Influence of incubating temperature on the amounts of spare yolk at hatching of Ring-necked Pheasants (*Phasianus torquatus*) and Bob-white (*Colinus virginianus*).

the yolk is not efficiently utilized because of the retardation in growth of the embryo and the lowered metabolic rate during the latter part of incubation, while at low temperatures the yolk is large (Romanoff, 1943) owing to an improper physicochemical state of the yolk's contents. The smallest weight of spare yolk undoubtedly is indicative of the greatest metabolic efficiency of the embryo.

Rate of assimilation under feeding and starvation.—Newly hatched birds are known to be able to live for a number of days with neither food nor water, although absorption of yolk material proceeds rapidly after the bird is hatched. The absorption of this yolk is practically complete five days after the bird has hatched, but small remnants of the sac often persist much longer.

None of the birds studied were able to survive the period of starvation in which feed and water were withheld for 120 hours or for five days after removal from the incubator (In practice baby birds are removed from the incubator about 48 hours after hatching in order to allow them to dry off completely). As was expected, the longer the period of starvation, the greater was the loss of body weight.



TEXT-FIGURE 2.—The rate of assimilation of spare yolk after hatching by Leghorn Chickens (*Gallus gallus*), Ring-necked Pheasants (*Phasianus torquatus*), Pekin Ducks (*Anas platyrhynchos*), White Holland Turkeys (*Meleagris gallopavo*), Pekin (*Anas platyrhynchos*), and Bob-whites (*Colinus virginianus*), under feeding and starvation.

In this study the assimilation of the spare yolk was measured in fed and starved birds, including chickens, pheasants, quails, turkeys, and two species of ducks. Fed chicks showed a gain in body weight practically from the time of hatching (Text-figure 2—A), while pheasant chicks and poults showed a slight loss in weight during the first day or two (Text-figure 2—B and D) since they do not take in any food for that period. The weight of starved birds decreased consistently with all species (Text-figure 2—A, B, C, D, E, and F).

The spare yolk was assimilated more rapidly by chicks and pheasant

chicks which were fed (Text-figure 2—A and B). In fed poults, the yolk was absorbed more rapidly than in starved birds, only after the third or fourth day (Text-figure 2—D). One group of pheasant chicks, which was supplied with water alone, showed a slow but continual decrease in body weight and spare yolk which was intermediate between the fed and starved birds (Text-figure 2—B).

The yolk of unfed chicks on the fourth day contained a considerable amount of gelatinous material. Also the wings of these chicks resembled long pin feathers while those of fed birds possessed normal wing feathers.

The contents of the yolk sac in the unfed pheasant chicks on the fifth day did not differ from those of previous days. On the other hand, the yolk-sac contents of the fed pheasant chicks became fluid, undergoing a change suggestive of cystic degeneration. With poults, two out of three yolk sacs rotted in unfed birds.

Physicochemical changes with assimilation.—The dry material in the spare yolk decreased more rapidly than the total wet weight, indicating utilization of the actual food material (Table 2). The hydrogen-ion concentration of the spare yolk, in both the chicks and ducklings, gradually changed from neutrality to a slightly acid condition.

Although the actual amount of ether extract decreased after hatching, the percentage weight in relation to the entire yolk did not show any significant change. The refractive index also did not show any appreciable change but the slight increase in iodine number indicates a possible preferential absorption of fatty material by the chick. This agrees with the data of Entenman, Lorenz, and Chaikoff (1940) that show a gradual decrease in percentage of fatty acids in the yolk.

DISCUSSION

It is evident that the amount of the reserve yolk in the bird at hatching may vary according to several different factors. Smaller species of birds have, in general, a lower percentage of yolk weight than larger species (*cf.* Table 1). Also extreme incubation temperatures result in abnormal retention of the yolk (*cf.* Text-figure 1). Jull and Heywang (1930) noted that at hatching time the percentage weight of reserve yolk material varies among different hens as a characteristic of the individual, but it is independent of chick sex.

Studies on the metabolism of the reserve yolk in the chick indicate its completely nutritive function after hatching. There is a rapid absorption of fatty material (*cf.* Table 2) and protein. Entenman,

Lorenz, and Chaikoff (1940) determined that at hatching the yolk sac had about 0.5 gm. of fatty acids, while on the fifth day it retained only 0.03 gm. Phospholipid and cholesterol were also absorbed, but in lesser amounts. According to Romenski (1919) the protein in the yolk is rapidly utilized during the 36 hours of starvation after hatching. He showed that during this period the yolk lost 160 mgs. of nitrogen, while the chick's body gained 35 gms.

During five to seven days of starvation, the total loss was from one-third to one-half of the original body weight. It is interesting to note that according to Iljin (1917) there is no change in dry weight of starved chicks. This would indicate that during starvation the bird lives entirely on spare yolk without the destruction of the constitution of the organism. This makes it possible for the bird to maintain normal body functions after a prolonged starvation, without detrimental effects on later life.

There is apparently very little effect of starvation on the rate of absorption of the reserve yolk in the species studied (*cf.* Text-figure 2). Similarly in work by Parker (1929), poisons and extreme brooding temperatures did not change appreciably the absorption rate of the yolk nor the further growth rate of the chick. She also found no correlation between the yolk-absorption rate and the general vigor of the chick. The assimilation is not materially affected either by the quantity of food consumed (Schillinger and Bleeker, 1928, and Parker, 1929) or by cold drinking water (Heywang, 1940).

Although it is apparent that assimilation of the yolk is a fairly regular process despite starvation or feeding, yet in practice, early feeding should not be harmful. In fact, feeding may induce a slightly more rapid rate of yolk assimilation (*cf.* Text-figure 2). Also, starvation may result in high mortality during the brooding period as has been shown by Fronda, Benetz, and Monegas (1937)—the longer the period of starvation, the higher the rate of mortality. This is presumably due to inadequacy of spare yolk in some chicks which early reach a critical stage of starvation. It is not advisable, therefore, to withhold feed and water from newly hatched birds longer than necessary after removal from the incubator.

CONCLUSIONS

From the study of several species of birds it was found that the relative amount of spare yolk at hatching varies with the size of the egg, being smallest in species laying small eggs and much larger in birds laying large eggs.

Much greater amounts of spare yolk were retained in birds hatched under extreme temperatures.

The average rate of assimilation after hatching was fairly identical in both fed and starved birds, although the individual variation was high.

Physical and chemical studies of spare yolk during assimilation show some changes in fats, indicating their preferential absorption.

TABLE 1
AMOUNTS OF SPARE YOLK FOUND AT HATCHING IN VARIOUS SPECIES OF BIRDS

Species of Birds	Birds observed	Original egg weight	Weight of bird without yolk sac	Weight of yolk sac	Yolk sac Bird × 100
	number	grams	grams	grams	%
Bob-whites (<i>Colinus virginianus</i>)	6	9.0	4.95	0.49	9.9
Ruffed Grouse (<i>Bonasa umbellus</i>)	189	18.0	11.40	1.56	13.7
Ring-necked Pheasants (<i>Phasianus torquatus</i>)	11	32.0	14.10	1.84	12.7
Jungle Fowl (<i>Gallus gallus</i>)	5	35.0	21.07	2.59	12.3
Guinea Fowls (<i>Numida meleagris</i>)	2	40.0	27.91	4.00	14.3
Mallards (<i>Anas platyrhynchos</i>)	8	58.0	30.81	5.66	14.6
Leghorn Chickens (<i>Gallus gallus</i>)	67	60.0	32.34	6.16	19.0
Brahma Chickens (<i>Gallus gallus</i>)	4	64.0	41.63	7.25	14.9
Runner Ducks (<i>Anas platyrhynchos</i>)	14	65.0	37.50	8.47	23.9
Pekin Ducks (<i>Anas platyrhynchos</i>)	6	80.0	50.99	9.18	18.0
White Holland Turkeys (<i>Meleagris gallopavo</i>)	7	80.0	45.48	11.26	24.8
Bourbon Red Turkeys (<i>Meleagris gallopavo</i>)	11	85.0	52.47	12.18	23.2
Emden Geese (<i>Anser anser</i>)	3	198.0	98.83	21.24	21.5

TABLE 2
PHYSICOCHEMICAL CHANGES IN SPARE YOLK OF THE CHICK

Age after hatching	Amount			Hydrogen-ion concentration		Ether extract				Fatty acids†
						Amount		Iodine number	Refrac- tive index	
	Wet	Dry	%	Chick	Duckling*	grams	%	value	"(D)	
days	grams	grams	%	pH	pH	grams	%	value	"(D)	%
0	7.62	4.38	57.4	7.29	7.05	1.33	17.5	73.89	1.468	11.9
1	6.02	3.40	56.5	6.81	6.84	0.89	14.8	77.28	1.471	9.1
2	4.09	2.30	56.2	6.59	6.45	0.67	16.4	79.41	1.471	8.0
3	2.38	1.27	53.4	6.53	6.27	0.38	15.9	85.89	1.473	7.0
4	1.43	0.75	52.4	6.60	6.40	0.21	14.7	88.55	1.475	6.1
5	1.16	0.62	53.4	6.63	6.28	0.22	19.0	85.19	1.475	5.3

* The data on the duckling are included here for comparison with that of the chick.

† The data of Entenman, Lorenz and Chaikoff (1940).

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HISTOLOGICAL STUDY OF THE DIGESTIVE SYSTEM OF THE ENGLISH SPARROW

BY L. J. GIER AND OTTIS GROUNDS

Plate 9

THE available literature shows that little histological work has been done on the digestive systems of birds. The most extensive single piece of literature is that of Calhoun (Calhoun, M. Lois. The microscopic anatomy of the digestive tract of *Gallus domesticus*. *Iowa St. Col. Jour. Sci.*, 7: 261-382, 1933). This paper gives a good review of the previous work.

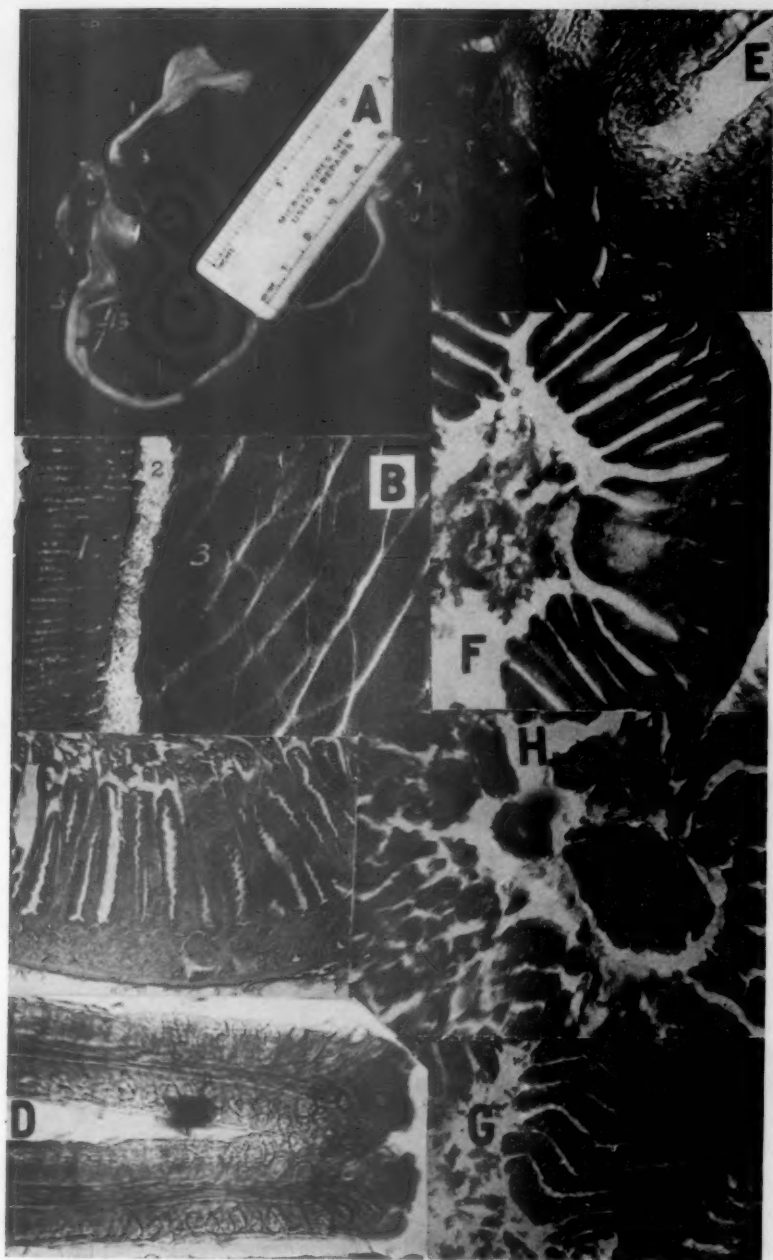
In the study described below, digestive tracts of ten English Spar-

rows (*Passer domesticus domesticus*) were examined. Representative areas of the ventriculus, five regions of the intestines (Plate 9, fig. A, 5-9), liver, and pancreas were sectioned in paraffin and stained with Delafield's hematoxylin and eosin. Photomicrographs were made on Plus X 35 mm. film using exposures of one and sixteen seconds for low and high power, respectively, and with a lens aperture of f. 4.5.

There were no observed sex differences in the tissues studied. The gross anatomy of a typical system is shown in fig. A. The esophagus (1) has a single outpouching to form the crop (2). The proventriculus (3) is covered with a serous layer and lined with glandular tissue. The ventriculus (4) is a laterally flattened disc composed of heavy muscles. It is lined with a horny layer and contains a quantity of fine gravel. The plagiocoelous intestines (5-9) gradually decrease in diameter from the duodenum to the rectal region. The two bile ducts and three pancreatic ducts enter the duodenum. No remains of the attachment of the stalk of the yolk sac were found. There is no marked difference between the duodenum, jejunum, and ileum. At the juncture of the small intestine and the rectum (9), the paired elliptical caeca (10) may be found. The two-lobed liver (11) lies mostly on the right side of the ventriculus. The gall bladder (12) is on the dorsal side of the right lobe. The long ribbon-like pancreas (13) is in the curve of the duodenum.

The tunica propria of the ventriculus is simple cuboidal epithelium forming crypts (fig. B, 1). These rest on a submucosa of connective tissue. The mucosa (3) is formed of a thick layer of muscles. The structure of the small intestine, with the exception of the duodenum, is similar throughout. The inner layer is lined with simple columnar epithelium with many large goblet cells. These latter increase in number posteriorly (fig. C and D) and are probably mucus-secreting cells. The submucosa of the duodenum is composed of three layers of Glands of Lieberkühn while but a single layer may be found in the rectal region (fig. E). These glands are much more numerous than Calhoun found for the domestic fowl. The mucosa varies but slightly in the five regions studied. The villi are longest in the duodenum and are successively shorter in the other regions studied. Only a few "leaf-like" villi were found. In the rectal region, the villi were frequently grouped as shown in fig. F. These villi also clearly show the presence of lacteals and blood vessels (figs. D and E). The villi in about half of the sections from the posterior end of the jejunum-ileum show definite irregularity (fig. G).

In general, the liver and pancreas show no variations from those



HISTOLOGY OF THE ENGLISH SPARROW

of the domestic fowl, except that the Islets of Langerhans (in the pancreas) are separated from the remainder of the pancreas by connective tissue (fig. H).

EXPLANATION OF PLATE 9

Figure A Typical digestive system of English Sparrow (intestines have been loosened from mesenteries)

- | | |
|---|---------------------|
| 1 Oesophagus | 9 Rectum |
| 2 Crop | 10 Caeca |
| 3 Proventriculus | 11 Liver |
| 4 Ventriculus | 12 Gall bladder |
| 5 Duodenum | 13 Pancreas |
| 6-8 Jejunum and ileum | |
| B Section of ventriculus 110 X | |
| 1 Tunica propria | |
| 2 Submucosa | 3 Muscles of mucosa |
| C Section of duodenum 110 X | |
| 1 Villi showing goblet cells | |
| 2 Submucosa with Glands of Lieberkühn | |
| D Villi of rectum showing goblet cells, lacteals, and blood vessels | 440 X |
| E Submucosa of rectum with Glands of Lieberkühn | 440 X |
| F Section of rectum showing grouping of villi | 110 X |
| G Irregular villa | 110 X |
| H Section of pancreas with blood vessel and Islet of Langerhans | 440 X |

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THE BROKEN-WING BEHAVIOR OF THE KILLDEER

BY C. DOUGLAS DEANE

Plates 10, 11

THE most interesting behavior of the Killdeer (*Oxyechus vociferus*) is its polished performance of the broken-wing action—a device useful to many ground-nesting birds in luring enemies from the nesting area.

The display of the broken-wing trick is, in the opinion of many observers, a reflex action that automatically functions when an enemy enters the breeding territory. It is not dependent upon the presence or absence of eggs or young. In the case of the Killdeer, I cannot help thinking that it is too polished a performance to be merely a reflex action. There must be a considerable amount of training and intelligence combined in this trick, as the bird has evolved procedures that

vary with the different types of enemies. The production of a different display best suited to the characteristics of the approaching enemy is surely evidence of something more than mere instinct. Bent (Bull. U. S. Nat. Mus., 146: 208, 1929) quotes an observation describing the reaction of a nesting Killdeer to a man on horseback, in which the Killdeer showed great intelligence in switching from the display used for the ungulates to the broken-wing behavior used for the enemy, man.

The brilliant cinnamon coloring of the lower back and tail is displayed as a threat color, like that of the red breast of the British Robin (*Erithacus rubecula melophilus*). I saw it used toward another male, that had entered the territory, when the resident male ran toward the newcomer with wings open (Plate 10, middle figure) and, when about six feet away, suddenly turned about so that the brilliant tail coloring flashed into view. It is used also as a means of attraction when both sexes posture with wings half open, exposing the yellow hues, but in this case the tail is arched over the back and not depressed as in the threat display.

Would not the Killdeer be better off, when danger threatens, by: (A) leaving the protectively-colored eggs and disappearing as silently as possible, as does the European Curlew (*Numenius a. arquatus*), and remain away while the enemy is in the territory? The bird must realize that its eggs are colored protectively by the way it furtively abandons the nest. Or (B) sitting perfectly still on the eggs, relying on its ruptive coloration to escape observation as does the American Woodcock (*Philohela minor*)? If the eggs were not protectively colored as in the Anatidae, there would be some design in the Killdeer's method of throwing itself into the limelight.

The most important time, I think, for the proper use of the broken-wing action is after the eggs have hatched and the young are scattered in the undergrowth. A Spotted Sandpiper (*Actitis macularia*) had its nest thirty feet from that of a Killdeer and, although I entered its territory many times, never did I see any display aimed at attracting my attention until the eggs had hatched. Then one of the adult birds ran along the water's edge with both wings half-closed and beating wildly. Whether by accident or design the Killdeer has, by its wild alarm cries and extensive posturing, removed the ever-present danger from the eggs to itself.

The duration of the broken-wing reflex lasts from the time the Killdeer assumes a recognized breeding territory until the young are seven to ten days old and the potency of sex-control has diminished.

The procedure of the broken-wing action varies with the approach



(Upper figure), KILLDEER IN THREATENING ATTITUDE TOWARD ANOTHER KILLDEER. (Middle figure), ATTITUDE TOWARD AN ENEMY ENTERING THE TERRITORY. (Lower figure), BROKEN-WING BEHAVIOR. (*Photographs copyrighted by the author.*)

of the different enemies. With man as an enemy, the bird displays when twenty to thirty feet away, with the distance appearing to decrease as hatching time approaches. When the young are hatched, the brooding bird performs about ten feet away. With canine enemies, the birds trail along about six feet in front. With non-predatory enemies like sheep and cattle, the bird does not leave its nest at all but waits until the animal is three or four feet distant before frightening it away.

PHASE I.—This is applied to predatory animals such as man, fox, dog, etc. When I opened the gate of a field in which Killdeers were breeding, the brooding bird ran off the nest almost immediately, although I was still at least fifty yards away. Crouching, running silently and fast, the bird made for the opposite corner of the field. If I stopped or kept away from the nest no action was taken beyond agitated alarm calls and constant flight around the territory by both birds. When I approached the nest, one of the birds, presumably the one that was brooding, would alight about twenty feet away and run toward me, crouching with wings half open but the primaries not extended, uttering a piercing alarm call (Plate 10, upper figure).

This procedure has an alternative that I witnessed on numerous occasions, especially if I moved too fast towards the nest; the bird ran toward me with wings held high over the body (Plate 10, middle figure) and the tail spread but not depressed. If I stopped or moved away, the display ceased but the bird continued its wild alarm calls.

PHASE II.—When I moved toward the nest, the Killdeer suddenly turned around so that its tail was toward me and the yellow throat-color was shown. The bird now exhibited the true broken-wing behavior. Calling all the while, it crouched on the full length of the tarso-metatarsus with the wings drooping, exposing the brilliant ochraceous color of the rump and tail. The tail was depressed with the feathers cutting against the soil, one wing was beating violently on the ground and the other wing was half open, twisted against the back, and waved excitedly in the air. The bird eyed me for a sign that I was interested; I was and so followed it. The Killdeer immediately rose and ran rapidly for some six feet with its wings hanging loosely, the tail still spread, and the bird leaning to one side. It crouched again and performed the same trick, sometimes with variations, beating both wings on the ground or waving them above the back (Plate 10, lower figure).

The displaying bird likes to be screened by a plant-stalk or a stone, no matter how small. The procedure is normally repeated until the

enemy has been lured away from the eggs. Usually only one bird performs at a time but, when hatching time approaches, both birds may perform together; in fact when I was watching the pair displaying, one bird—the male—suddenly stopped, ran over to the eggs, and continued to brood while the female continued the broken-wing performance.

PHASE III.—I was fortunate in seeing this type of display since it varies only slightly from the posture adopted for frightening ungulates (Plate 11, lower figure). It occurred as I approached the nest on my customary inspection to see if the eggs had hatched. The brooding bird, instead of slipping off the nest and creeping away, as was the usual practice, stood in front of the nest with the wings spread on the ground in an arc and calling excitedly (Plate 11, upper figure). I can explain this peculiarity only by the fact that an egg had hatched in the nest and caused the wrong type of display.

PHASE IV.—The procedure for the protection of the eggs from such intruders as cattle and horses varies according to circumstances. I once witnessed the leisurely approach of a cow towards the nest. When the animal was about ten feet from the nest, the brooding bird became excited and stood in front of the eggs, calling. It fluffed its feathers out and, with the trailing wings occasionally beating on the ground or waved wildly in the air, it ran toward the cow. Then it suddenly flew up and hit the beast on the muzzle, dropping to the ground before flying sharply in front of the animal's head, uttering all the time a peculiar wheezing cry. The frightened but uninterested mammal shied to one side and continued its leisurely progress across the field, missing the nest with its hoofs by almost six feet (Plate 11, lower figure).

On another occasion, I arrived to find my blind smashed and the imprint of a cow's hoof in the center of the Killdeer's nest. The cow, no doubt, had been attracted by the unusual object which may have had something to do with the failure of the Killdeer to save her eggs.

PHASE V.—Correlated with the broken-wing action is a subsidiary display of dummy nest-brooding. It takes place during phases I and II and is another example of the high degree of protection that the Killdeer gives its eggs. The decoying bird, during one of her short runs in the midst of the display, will suddenly squat down behind a plant stalk or in a hollow and shuffle about as if settling on eggs. I have no data on whether this procedure is adopted for enemies other than man.

I am of the opinion that when the eggs hatch and the young are



(Upper figure), ATTITUDE OF A KILLDEER TOWARD A MAN APPROACHING THE NEST.
(Lower figure), STANDING IN FRONT OF EGGS AT THE APPROACH OF AN UNGULATE. (Photographs copyrighted by the author.)

seven to ten days old, the breeding territory becomes common ground and other Killdeers are not molested. In fact, a form of mutual aid exists and the young seem to be pooled. On the approach of danger, the broken-wing action is discarded for vigorous flight and wild alarm calls around the intruder. I once found six nestlings being protected by four adults, which may or may not be the usual practice.

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SOUTHEASTERN LIMITS OF THE SPOTTED SANDPIPER'S BREEDING RANGE

BY HENRY M. STEVENSON, JR.

ACCORDING to the A. O. U. Check-List (1931), the southeastern breeding limits of the Spotted Sandpiper (*Actitis macularia*) are "southern Louisiana, central Alabama, and northern South Carolina." The records on which this statement is based are hazy, however, and some apparently are quite undependable. Furthermore, my own experience in the South (1929-1941) leads me to believe that the species does not breed regularly (if at all) anywhere south of central and eastern Tennessee and western North Carolina.

Inclusion of "central Alabama" in the statement of range is based on Howell's 'Birds of Alabama' (1928). Among the definite dates listed in this work, those which most nearly approach the breeding season are May 25 (at Leighton) and June 1 (on Petit Bois Island). These dates are not abnormally late for the spring migration. I have found late individuals at Birmingham on May 25, 1935; at Florence, May 25, 1941; and at Tuscaloosa, May 28, 1938.

Without citing definite dates, Howell (*op. cit.*) also states that the Spotted Sandpiper has been observed "in the breeding season" in Autauga County, on the Tensaw River (near Stockton), at Stevenson, Seale, and Bayou Labatre, and on Petit Bois Island. By a study of the dates of occurrence of other species recorded by Howell at the same localities, it is possible to determine within a few days the dates during which he visited these localities. The record at Stevenson was made on or about July 15, at Seale about May 22, at Bayou Labatre about May 20, and on the Tensaw River about May 27. The date of the Petit Bois record is mentioned above.

The listing of the Spotted Sandpiper in Autauga County in the breeding season probably rests on L. S. Golsan's manuscript notes, where it is called a "summer resident." Careful reading of these

notes and correspondence with Golsan reveal that he had no definite June records nor breeding evidence for the species.

The Spotted Sandpiper observed at Stevenson (July 15) was undoubtedly an early fall migrant. I have seen it on the same date (in 1935) at Lake Purdy, near Birmingham, but have never found the species anywhere in Alabama between May 28 and July 15.

The only evidence submitted by Howell for the breeding of the Spotted Sandpiper in Alabama is that of Avery (1890-91) who found it "breeding, but not common" at Greensboro. Records of eggs or young are not mentioned.

In the absence of more definite evidence and of records between June 1 and July 15, the breeding of the species in this state must be considered extremely doubtful.

As for Louisiana, Oberholser (1938) states that George E. Beyer (1900) found it breeding near New Orleans and that Robert Butler "reports it breeding in West Feliciana Parish," but he does not give the exact evidence for these records. His own record of one seen at Grand Isle, June 9, 1933, is the latest record for the spring migration listed in this source. The bird seen by Kalmbach at Tallulah, July 6, 1924, probably was an early fall migrant. It is not unusual for several other species of shore birds to remain in the South until early June and return in July, yet these species are not properly classed as summer residents.

George H. Lowery, of Baton Rouge, states in a recent letter: "No Spotted Sandpiper nest has ever been found in Louisiana, so far as I know. The records of breeding by George Beyer and others may well have been merely birds present in June . . . I note that Robert Butler is cited . . . as one of the authorities for the actual nesting of a bird in Louisiana. I question whether he actually found a nest or young."

The breeding of the Spotted Sandpiper in South Carolina is probably based on Loomis's list (1879) from Chester. The only comment he makes is: "Summer, not *very* common." The ambiguous term "summer" is also applied to the "Solitary Tattler" (*Tringa solitaria*), which certainly does not breed there.

Even in North Carolina, only a single breeding record is cited by Pearson, Brimley, and Brimley (1942). These authors quote from the manuscript of T. D. Burleigh the record of young birds only a few days old found near Asheville, June 20, 1932. Burleigh further states: "At no other spot have I observed it in June, although it is quite possible that other pairs may have been overlooked."

In view of the haziness of most of the 'breeding' records cited above, it is altogether unlikely that the Spotted Sandpiper breeds anywhere in Florida. Howell (1932) says that "apparently a few remain all summer, but there is no record of their breeding." The latest date in spring and the earliest in fall are June 4 and July 2, respectively.

H. H. Bailey (1925, 1932) stated that he had taken downy young in Florida. Such a positive and definite statement is difficult to refute. However, Bailey's records of nesting Phoebes, Baltimore Orioles, and Black-billed Cuckoos were not accepted by the A. O. U. Committee in 1931, so it seems best to conclude, until additional evidence is presented to the contrary, that the Spotted Sandpiper does not nest in Florida.

Ganier (1938) speaks of the Spotted Sandpiper as a very rare summer resident in middle Tennessee and fairly common in eastern Tennessee, but apparently the only definite nesting record is that of Lyle and Tyler (1934), at Johnston City, June 10 (? 1934). Clebsch (1943) has rarely seen individuals at Clarksville as late as June 7, and as early as July 4. The nesting of the species there is not unlikely.

It is possible that the Spotted Sandpiper rarely breeds in northern Georgia, although there seems to be no record of its doing so. I could not find the species in June and early July at Highlands, North Carolina, just across the state line from Georgia (Stevenson, 1941). There are no records of its occurrence at Atlanta between May 30 and July 12 (Griffin, 1941). The extremes of migration at Athens are May 31 and July 15 (Burleigh, 1938).

The only valid record for the breeding of the Spotted Sandpiper in the Lower Austral parts of the South appears to be one made by M. G. Vaiden, who has kindly described, in a letter dated January 11, 1943, the full circumstances of this unusual occurrence. The bird was flushed along the shore of Eagle Lake (just north of Vicksburg), Mississippi, on May 24, 1932. Search resulted in the discovery of a nest in a growth of cat-tails within eight feet of the water line. It consisted of a shallow depression in the soil, lined with a few leaves of cat-tail, and contained four eggs. A fifth egg lay on the ground a few feet away. Four of these eggs were infertile. Another Spotted Sandpiper had been flushed 200 yards away before the nest was discovered. A comparison of these eggs with other sets of Spotted Sandpipers' eggs convinced Vaiden of their identity. Other summer records of Spotted Sandpipers were made near Rosedale, also on the Mississippi River, June 3, 1935; June 18, 1937; and June 27, 1938. There was nothing about the actions of these latter birds to indicate that they were nesting.

It is well to add that Vaiden, although presenting very convincing circumstantial evidence of the Spotted Sandpiper's breeding, does not submit this as absolute proof, being well aware of the unusual nature of the occurrence. This fact adds to the likelihood that the record is valid, although it should probably be regarded as a casual one.

SUMMARY

The evidence presented above suggests that the breeding range of the Spotted Sandpiper does not include southern Louisiana and northern South Carolina and that it certainly does not extend south to central Alabama. Furthermore, in these states and in Florida there are no published records of its occurrence between June 9 and July 2. There are, however, two Mississippi records falling between these dates. These were made along the Mississippi River north of Vicksburg. Another record in this region probably represents breeding.

Until more definite breeding evidence is presented for South Carolina, Georgia, and the Gulf States, the southeastern breeding limits of this species should be described as "middle (?) and eastern Tennessee and western North Carolina, casually to western Mississippi."

ACKNOWLEDGMENTS

The valuable assistance of Capt. George M. Sutton, in carefully reading this manuscript and in eliciting additional information by correspondence, is deeply appreciated. Furthermore, the following ornithologists supplied valuable data through their correspondence: George H. Lowery, Baton Rouge, Louisiana; Thomas D. Burleigh, Gulfport, Mississippi; M. G. Vaiden, Rosedale, Mississippi; Albert F. Ganier, Nashville, Tennessee; and Lieut. Harry C. Monk, Fort Belvoir, Virginia.

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MIGRATION OF THE RED-HEAD FROM THE
UTAH BREEDING GROUNDS

BY CECIL S. WILLIAMS

THERE are only a few areas in the United States where the Red-head (*Nyroca americana*) still breeds in appreciable numbers and of these remaining areas, the marshes and sloughs of northern Utah are among the most productive. The forces of civilization in this region have been retarded in their rate of encroachment upon the breeding habitat by the vast acreages of submarginal land; by the Federal and State Refuge Systems that have saved important parts of the breeding environment; and finally, by the early realization among the people that the marshes and the birds frequenting them are economic assets. As a consequence, the seed-stock of the Red-head is above the average and thousands of young birds are produced annually.

An idea of the productivity of Red-heads by the Utah breeding grounds was indicated by Williams and Marshall in 1938 [Journ. Wildlife Management, 2 (2): 29-48, Apr. 1938]. They recorded 343 Red-head nests on a selected sample area of 3,000 acres of available nesting vegetation on the Bear River Migratory Bird Refuge, a density of 0.11 nest per acre. The hatch was low at that time, but since then the mortality factors have been reduced in effectiveness and increased productivity on managed areas has been noted. There are reasons to expect further increases, but any appreciable amount over the breeding ground as a whole will be largely dependent upon more intensive management unless greater efforts are expended by conservation agencies, game clubs, wildlife federations, and individual conservationists in providing and maintaining more nesting environments.

Conditions on the breeding grounds, despite their importance, do not give the complete picture in the management of a species of waterfowl. The birds must migrate, winter, and migrate again, and adequate provisions for their requirements should be made on their travel routes. Thus from the standpoint of developing a broad management program for the birds of this particular breeding stock, it becomes essential to be informed of their migratory habits—the where, how, and when of their habits after they attain flight on the breeding grounds.

Resort has been made to the data from the banding of young Red-heads in order to obtain some of the needed information. A number of immature Red-heads have been banded on the Bear River Migratory Bird Refuge every year since its establishment in 1929, but significant numbers for the Bear River marsh area as a whole are available only for the years 1929, 1930, and 1931. Banding operations on the Bear River Refuge and on the Utah State Public Shooting Grounds, a portion of the breeding environment near Corrine, Utah, were carried on by Biological Survey personnel between July 14 and August 7 of these years. Banding was done while the young were still in the flightless stage.

RETURNS

The number of young birds banded during the periods under consideration totalled 2,332. Of this figure, 357 (15.3 per cent) bands were returned from birds shot by sportsmen in different sections of the continent. The distribution of returns, as evident in the accompanying map (Text-figure 1), shows the importance of the

Utah breeding grounds to the sportsmen elsewhere on the continent. Bands were returned from 18 states, 1 Canadian province, and 3 Mexican states.

The banding data are summarized in Table 1, and it is evident from the tabulations therein that the first shooting season is the most critical for the birds. At least 13.3 per cent of the banded population was taken during that period, as compared to averages of 1.6 per cent, 0.17 per cent, and 0.12 per cent for second, third, and fourth

TABLE 1

DATA OBTAINED FROM THE BANDING OF YOUNG REDHEADS ON THE NORTHERN UTAH BREEDING GROUNDS DURING 1929-31, INCLUSIVE

RETURN DATA ON BANDED BIRDS								
No. of birds banded & date	Age of birds when collected							
		-1 yr.	-2 yr.	-3 yr.	-4 yr.	-5 yr.	-6 yr.	Totals
1005 in 1929	No. of returns % of returns* Rate of return†	149 14.8% (87%)	18 1.7% (10%)	3 0.2% (2%)	1 .09% (.5%)	— — —	1 .09% (.5%)	172 17.1% (100%)
916 in 1930	No. of returns % of returns* Rate of return†	121 13.2% (91%)	11 1.2% (8%)	1 0.1% (.7%)	— — —	— — —	— — —	133 14.5% (100%)
411 in 1931	No. of returns % of returns* Rate of return†	41 9.9% (79%)	9 2.1% (17%)	— — —	2 0.4% (4%)	— — —	— — —	52 12.6% (100%)
2332 TOTALS	No. of returns % of returns* Rate of return†	311 13.3% (87%)	38 1.6% (10.6%)	4 0.17% (1.1%)	3 0.12% (.8%)	— — —	1 0.04% (.2%)	357 15.3% (100%)

* Percentage of the total banded population returned at different ages.

† Percentage of all bands returned at the different ages. Example: of 172 bands returned from young birds banded in 1929, 87% were from birds less than one year old; 10% from birds less than two years of age, etc.

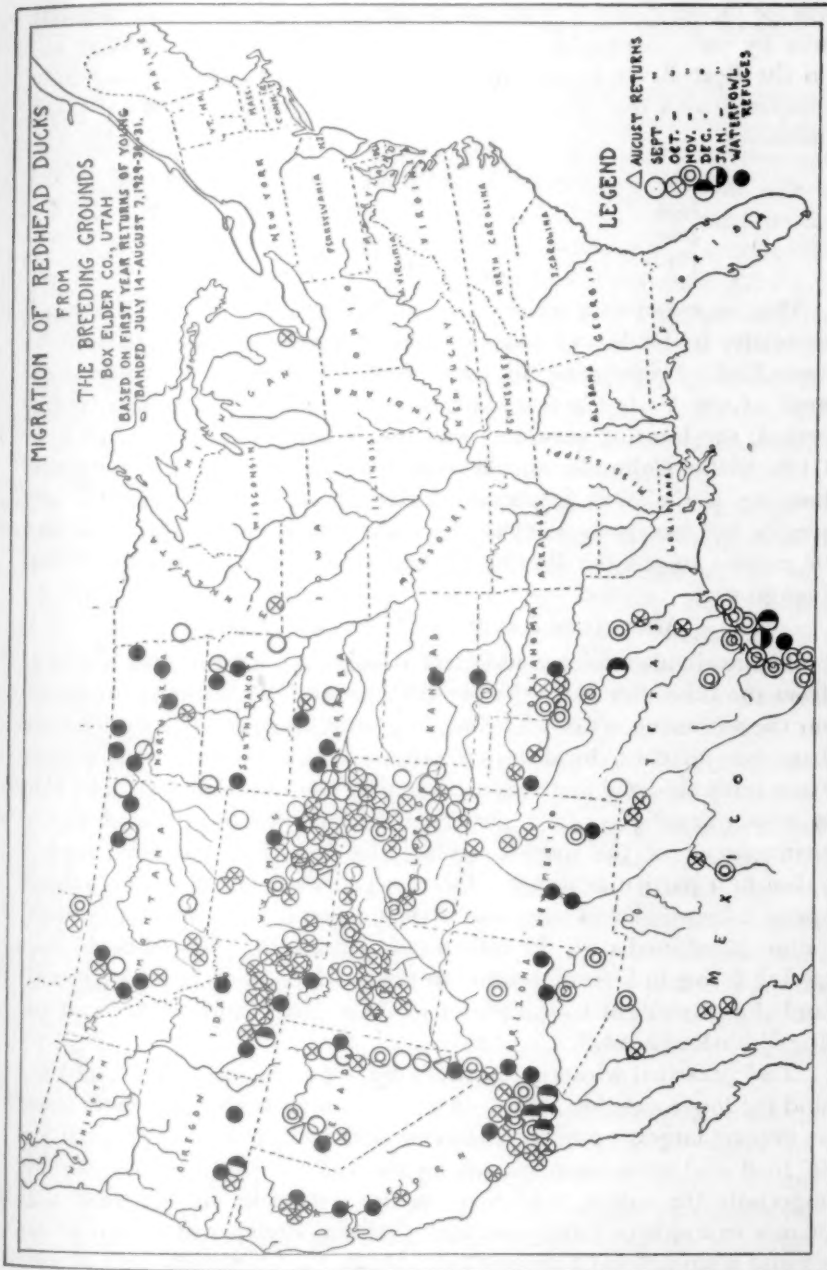
seasons following banding, respectively. The first season's return of bands represents an average of 87 per cent of all of the returns. In referring to the table, the figures, especially those pertaining to birds older than one year, should be interpreted with caution, as there are no data at hand to judge the average length of time bands remain on the ducks' legs, nor the population of banded birds remaining after various mortality factors have taken their toll. Unquestionably, banding returns lose much of their significance after the first year, but inasmuch as the percentages of banded birds taken while they were less than one year of age vary only 4.9 per cent over the three years of banding operations, the 13.3 per cent average kill

of the banded population may be taken as a basis for management until more accurate figures become available. This percentage applies to young birds produced each year, not to the adult population which may or may not be subjected to the same hunting pressure. However, no field observations have been recorded which would indicate that the hunting pressure differs appreciably between the two groups.

TIME OF FALL MIGRATION

Most young Red-heads of the region attain their powers of flight by mid-September. They are timid and secretive in habits on their breeding grounds, frequenting the dense bulrush marshes or the margins of open lakes. There is no tendency toward concentration after the birds can fly, and evidently departure is in small groups. The birds gradually filter out much in the same manner that they arrive in the spring, in sharp contrast to the migration of some of the other species, notably the Mallard, Green-winged Teal, and Pintail. In these, mass movement is commonplace, and an observer experiences little difficulty in knowing when they come or go. The Red-head, on the other hand, has much in common with the Ruddy Duck, a species which may be present in goodly numbers all during the nesting, brooding, and molting periods without giving much evidence of the fact.

Reference to the map (Text-figure I) will show that the filtering-out process begins soon after the birds become able to fly. The map also shows the months during which the birds may be expected at various points along their fall migration routes. Movement begins in August, as evidenced by the returns from Laramie, Wyoming; from Winnemucca and Las Vegas, Nevada; and from an unknown point in Mexico. The records are replete with returns from birds, flightless when banded in early August, taken during September in Colorado, Wyoming, South Dakota, North Dakota, Nebraska, Nevada, and Montana. Some of the birds are even on the wintering grounds during October. While the fall migration may start early, many young Red-heads remain on the breeding grounds until the latter part of October, as indicated by the large number of returns from Utah during that month. If any movement approaching mass migration does occur, it takes place during this period, for the November returns from Utah take a significant drop. In 1929 and 1930, a total of 104 October bands were returned from the State, as compared with only nine for November and two for December. The 1931 figures are not considered, as the shooting season of that year



TEXT-FIGURE 1.

was for October only. That the Red-heads mostly leave the breeding area by early November is also attested by records of hunting kill on the Bear River Refuge during the last two weeks of October, as compared with the kill of November 1-15 during the years 1938-40, inclusive:

<i>Year</i>	<i>Oct. 15-31</i>	<i>Nov. 1-15</i>
1938	394	44
1939	60	12
1940	215	30

The importance of these data to management of the Red-head, especially in Utah and adjacent states, is apparent; the kill can be controlled by regulating the time of open season. To give the Red-head of the Utah marshes the protection it deserves at this critical period, the hunting season should not begin before November 1, in Utah, Idaho, Colorado, and Wyoming. It is not meant to infer that hunting is the most important factor limiting the increase of the species, but merely to point to one management measure which would be certain to aid the Red-head population of this particular breeding ground.

MIGRATORY LANES AND WINTERING GROUNDS

The available evidence indicates a vagabond existence for the birds from the time they leave the breeding grounds until they concentrate on the wintering areas. The small groups apparently move leisurely from one favorable locality to another. If, however, only the returns from birds shot the first season after they were banded are plotted on a map (Text-figure 1), a pattern is formed which is useful in the management of the species. While the fact that a banded bird is taken in a particular locality does not give evidence of how it arrived there, a knowledge of the birds' habits, general physiography between points, combined with the return data from other banded birds, does permit filling in favorite routes. In this manner, the wintering grounds and the prominent travel routes to them have been worked out for the Utah Red-head.

Two principal wintering grounds are apparent—southern California and the lower coast of Texas. The place of wintering, however, seems to depend largely upon the character of the weather and the condition of food and cover at points along the route. The Imperial Valley, especially the Salton Sea, provides the attraction for the birds that winter in southern California; the wintering grounds of coastal Texas extend from around Corpus Christi south to Brownsville and Mexico and include such vast areas as the Laguna Madre. No returns of

Utah Red-heads are recorded from the excellent Sabine marshes of coastal Louisiana.

The routes by which the birds wander to the wintering grounds are several and differ in degree of pronouncement on the map not unlikely due to differences in the hunting pressure. The Texas coast seems to have several alternate highways leading to it. One follows the Bear River into Idaho and Wyoming; across Wyoming to the Pathfinder and Seminole Reservoirs and reservoirs near Laramie; the tributaries and reservoirs of the South Platte and Arkansas Rivers in Colorado; the Canadian and Pecos systems in New Mexico; and the Pecos, Red, Little Colorado, and Trinity systems in Texas. An alternate route uses the marshes south along the Wasatch Mountains, the Strawberry and Green rivers and reservoirs in Utah; the Yampa, Rio Grande, Gunnison, and Animas systems in western Colorado; to join the other route either in Colorado or New Mexico.

The most prominent travel route to southern California runs north into Idaho, and thence follows the Snake River probably to the Salmon and Bruneau tributaries and the Humboldt drainage in Nevada; thence southward through White Pine Valley, Ruby Lake, White River, and Pahrangat Lakes in Nevada. Some of the birds evidently branch off from this route near Elko, Nevada, and move westward to the Winnemucca Lake and Carson Sink country of Nevada and the Sacramento and San Joaquin valleys of California.

A few returns are recorded from widely separated localities in states east and north of Idaho and Wyoming, but considering the distributions of returns, the hunting seasons, and the density of hunters in all of the states, there is only a remote possibility that an appreciable number of Utah Red-heads travel across country to the east coast.

The data indicate that the Red-head is largely dependent, during migration, on chains of closely spaced habitats. Lakes and reservoirs seem especially to be frequented by the birds. In this connection, the improvement in feeding and resting conditions in any such impoundments on or along the rivers serving as traffic lanes would unquestionably be of value.

The Federal Government and some State Governments have within recent years established refuges at known concentration points for waterfowl. Reference to the banding map on which circles represent the locations of Federal waterfowl refuges will indicate that while the widely scattered refuges are situated at strategic spots for the Utah Red-head, there is need for more managed areas along the travel lanes before they will be adequately cared for. An expansion of the fed-

eral system is desirable in order to fill the blank spaces which are apparent on the map. In Colorado, for instance, which is a key Red-head state, there should be at least three major refuges in different parts of the state: one along the South Platte in Weld or Morgan counties; a second, along the Arkansas in the Pueblo or La Junta regions; and a third, in the Grand Junction or Durango areas of western Colorado. It should be emphasized, however, that many other considerations influence the selection of a refuge site, one of the most important of which is the possible damage to agricultural production by bird concentrations. This is a serious consideration in Colorado.

The greatest value would accrue to the birds, however, from the saving and improving of numerous small habitats between existing major refuges. This holds true for other species, as well as for the Red-head. Such projects are not economically feasible for the Federal Government, but do offer desirable undertakings for both state and local agencies, game clubs, and other conservation-minded groups and individuals. It may be well to sound a warning that unless these small but productive areas are saved for the future and improved by such activities, the sportsmen on many areas in the West will sooner or later find that the expected flight of birds has passed them by and is concentrated on major refuges where the food and cover are attractive but where no hunting is permitted.

SUMMARY

Analyses of banding returns from 2,332 young Red-heads banded between July 14 and August 7, during the years 1929, 1930, and 1931, on breeding grounds in northern Utah show that:

1. The birds from this breeding area were taken in 18 states, 1 Canadian province, and 3 Mexican states.
2. The first season of hunting is the most critical for the birds, but a 13.3 per cent annual kill of young birds may be used as a basis for management.
3. The fall migration is a filtering-out process of small groups, beginning in August and accelerating near the last of October so that the birds are mostly gone from the breeding grounds by early November.
4. The kill can be reduced appreciably by opening the shooting season in Utah, Idaho, Wyoming, and Colorado not earlier than November 1, each year.
5. The principal wintering grounds are the Salton Sea region of southern California and the lower coast of Texas from Corpus Christi to Mexico.

6. There are favored travel routes to wintering grounds. These are indicated on a migration map, and the need for closely chained feeding and resting habitats along the principal river systems which the birds follow is emphasized.

U. S. Fish and Wildlife Service
Brigham, Utah

WILSON'S PLOVER IN ITS SUMMER HOME

BY IVAN R. TOMKINS

Plate 12

THIS paper is intended to give a tentative view of the life history of Wilson's Plover (*Pagolla w. wilsonia*), compiled from notes made during the past nineteen years. About two hundred visits have been made to the nesting areas during the spring and summer seasons, and many more in autumn and winter. The notes mention about one hundred and five nests, with casual references to many more. Unfortunately it has not been practicable to present more complete studies of particular family groups.

A few visits have been made to plover habitats in Duval County, Florida; Glynn County, Georgia; and Charleston County, South Carolina; but most of the time involved has been spent along the lower Savannah River, in that most interesting progression from cypress swamp through fresh, brackish, and salt marshes to the beaches bordering Callibogue Sound and the Atlantic Ocean.

MIGRATION

March 3, 1931, is my earliest spring record, but that was of only a single bird, and no noteworthy migration occurred that year until some time during the night of March 14-15, when numbers of the birds arrived. The first groups of migrants do not stay long but pass on to more northerly breeding grounds. One may find many birds, or none, at almost any time from the middle of March to the first of April, about which latter date our local birds arrive. The first large flocks of spring contain both sexes.

The peak of the nesting season is in May and June, although a few nests may be found as late as early July. The birds remain sparingly on their territories until late July. By August 1, there is a noticeable thinning of the numbers to be found on the beaches and mud flats, although they are still to be found until early September, and an occasional one may be seen until the middle of October. My

latest autumn records are of single birds seen on October 17, 1930, and on the same date in 1931.

My notes contain nothing on family relations after the nesting season—whether the adults of a pair stay together in autumn and winter, or whether young and adults migrate together or separately.

Apparently the birds of this coast do not withdraw very far in winter, for there are January records from northern Florida at the mouth of St. Johns River, about 115 miles south of the Savannah River (Howell, 1932: 219).

HABITAT

The most desirable summer habitat is in the areas with a high salinity, but it is unknown whether this is as a concomitant of open ground of a certain kind, of some particular food, or of another factor or combination of factors. Open ground that appears to have desirable physical characteristics but does not have an ample plover population extends along the river banks some distance inland beyond the present range of the plover. In this locality, the favorite nesting grounds are on the open areas of the sandy islands and on the edges of the dunes. Apparently they are also close to creek entrances with mud-sand flats. I doubt if a hard-packed beach of sand is suitable.

The nests are frequently placed close to a piece of drift-trash or similar low windbreak. Sometimes a nest is on a slight eminence but equally often it is not. One nest was in the heel of a lady's slipper that had washed ashore. On Turtle Island, South Carolina, several nests on the side of the island toward the sound, where open ground was scarce, were placed just under the edge of the overhanging grasses (*Spartina patens*) but still on the open sand. Usually nests are not near thick vegetation.

In the choice of habitat, whether feeding ground or nesting ground, shelter from view is not liked. This plover is largely a running bird, often running away from an intruder in preference to taking flight. To a great extent, it feeds by standing still until food is sighted, then running directly to it. I think it does not like mud flats where the ground is soft and running is difficult; neither does it do much wading.

In 1923, the plovers nested only on Oysterbed Island, which is near the mouth of Savannah River. In 1928, a pair took up residence near Field's Cut, five miles up from Oysterbed. In 1929, another pair settled a mile beyond that. By 1935, the species had reached the mouth of Habersham Creek, eleven miles from Oysterbed, while in 1939, three pairs nested on Hutchinson Island, opposite the city of

Savannah and fourteen miles inland from the 1923 range. In the spring of 1942, one or more pairs were engaged in establishing territory a half mile farther westward, although this habitat had been available but not used in previous years.

While the plovers were extending their range in this fashion, there were changes in the river and its banks. Dredging opened out the channel so that there was an increasing salinity beyond the plover's range; additional open areas suitable for plover nesting were formed; then vegetation rendered them unsuitable in places, and many other things happened which cannot be detailed here, even if they were all clear and measurable. The extension of the range inland is thought to be due to population pressure, as there has undoubtedly been a considerable increase in numbers since the early 1900's. It is unknown what increase in range there has been along the coast.

In the region about the river entrance (the optimum habitat, because well-populated when the species was fewer in numbers than it is now) there is now such a population that the nesting ground is filled as completely as it is likely to be, while fairly suitable ground remains unpopulated farther inland. This premise is based upon the observation that the individual plover territory does not seem to contract much under population pressure. In other words, the plover territories remain about the same size in the larger colonies as where there are few resident pairs.

Two birds (a male from well inside the summer-habitat area and a female from the inland edge) had their stomachs filled with the remains of fiddler crabs of the genus *Uca*, probably *Uca minax* in both cases. Probably some species of land crab furnish a considerable portion of the food of the species, as they are numerous, available at all times during the summer season, and range over all the plover habitat in this locality. Thinking that some species of *Uca* or *Sesarma*, or some combination of two or more species, might be a major factor in habitat determination, I made an attempt to plot the plover habitat against the range of the crabs. Years of experience along the river had fairly well outlined the places where each species of crab would be found. The results, however, were not definite enough to permit any conclusions. Howell (1932: 220) lists such other food as shrimps, crawfishes, scallops, beetles, bugs, and spiders. The plovers have been seen to run along near the water's edge and gather bits of food left by the swells. Perhaps the shrimps, scallops, and such things are gathered in this manner. Much food, such as beetles, flies, crickets, and the like, is available on the territory.

BEHAVIOR

In any consideration of bird behavior during the reproductive season, it must be remembered that there are often out-of-season or out-of-sequence rehearsals of bits of behavior—rehearsals that are relatively unimportant but which tend to confuse the picture. Some of the interpretations given here may be incorrect for that reason.

Pairing.—The formation of the pair takes place prior to territory establishment. Later, when the males are engaged in determining the territories, females may or may not be present, and do not seem to be involved in the encounters between the males. The copulation ceremony often takes place away from the nesting ground.

I think that, in the main, the foregoing paragraph is true, though it is not intended to assert that pairing is invariably done before territories are marked out or that it is completely disassociated from the establishment of territory by the male. Males will chase other males from the vicinity of the female in courtship, and they use certain behavior in both situations. Later on in the incubation period, the female takes an active part in nest defense, even to the extent of driving her own mate from the vicinity of the nest.

Courtship is initiated by the male, and consists in posturing, in scrape-making, and in the pursuit of other males in the vicinity of the female. The posturing is done by puffing out the throat so that the dark neck-band, both front and back, stands out like a ruff, and in puffing the feathers of the breast so that they stand out wider than the feathers of the upper parts. The bird sometimes stands erect, but it has a sort of running crouch when, with the feathers puffed out, it chases another male away from the female it is trying to impress.

In scrape-making as it is done in courtship, the male approaches the female, picks a suitable nest site, and settles into it as though preparing a nest hollow. He picks up bits of shell or small sticks and arranges them. If the female is uninterested and moves away, he follows and again picks a spot near her for more scrape-making. After the pair is formed and territory is established, a similar performance takes place in locating the nest. At that stage the female has accepted the male and goes to him when he settles in a possible nest site and calls.

Courtship has been observed here as early as the middle of March, long before the birds were settled on territory. Bent (1929: 257) noted courtship activities in Florida in the month of March.

In the literature there are accounts of courtship flight in other species of plovers. In the present species, I have seen no flight that could be described as ceremonial, either in courtship or in territory

establishment. In the latter performance, males will chase each other until they fly and circle about for some distance, soon to return to the disputed ground. It is behavior which is common to nearly all of the shorebirds in many different situations, and I have not been able to find any deep significance in it.

No evidence of courtship feeding has been observed. Lack (1940: 176) does not list the plovers among those groups normally indulging in this behavior.

Copulation.—When ready for copulation, the female postures before the male, often moving ahead of him if he turns away. She crouches and spreads her wings slightly. The male walks up behind her and, for a little time, perhaps a minute or so, marks time with a sort of 'goose step,' lifting each foot alternately forward and back in the same place. He sometimes moves up behind her with this step, then mounts her back, tramples for a minute or so, working his feet in among the feathers, and then takes hold of her head with his bill before copulating.

Territorial defense.—One typical territorial combat between males is worth describing in detail. It was quite apparent that the fighting was definitely over territory and not over a female or in defense of a nest, for there was no female near and no nest in the territory. On this day, June 9 (later in the season than the usual courtship and territory-establishment period), three males, one of which took no part in the fight, were on a slight, sandy eminence topped off by a knoll a few inches higher. Two weeks before, this ground had been included in the territory of another pair, and a brood of young ones had been hatched nearby. None of the three males was concerned with that territory and nest, for the pair was then escorting the brood of young ones some little distance away.

At the commencement of the fight, one male spread its tail and crouched as though in a nest. Each time it did so, another male would run at it, but after several such parries the displaying bird stood its ground and showed fight. Both birds then circled around over the sand. One of them would fly and run the five or six intervening feet directly at the other which would try to avoid it. One or more times a bird was knocked down in that way. The action was extremely rapid and hard to follow. After perhaps five minutes of this combat, one bird moved away about fifty feet and stopped while the victor stood on the knoll and uttered some loud *peets*. The third male stood for a time, then squatted a little and moved closer, only to be driven away. Each time the victor stood erect and used the

peet note from the highest point on the knoll. The bird that had been defeated in the fight stood quietly about fifty feet away and was not bothered by either of the others.

It seemed that it was the squatting of another male that released the pugnacity of the territory-holding male. One might question if this is exactly the same as scrape-making. It seems to me that it probably is the same, though possibly an abbreviated or conventionalized form of it.

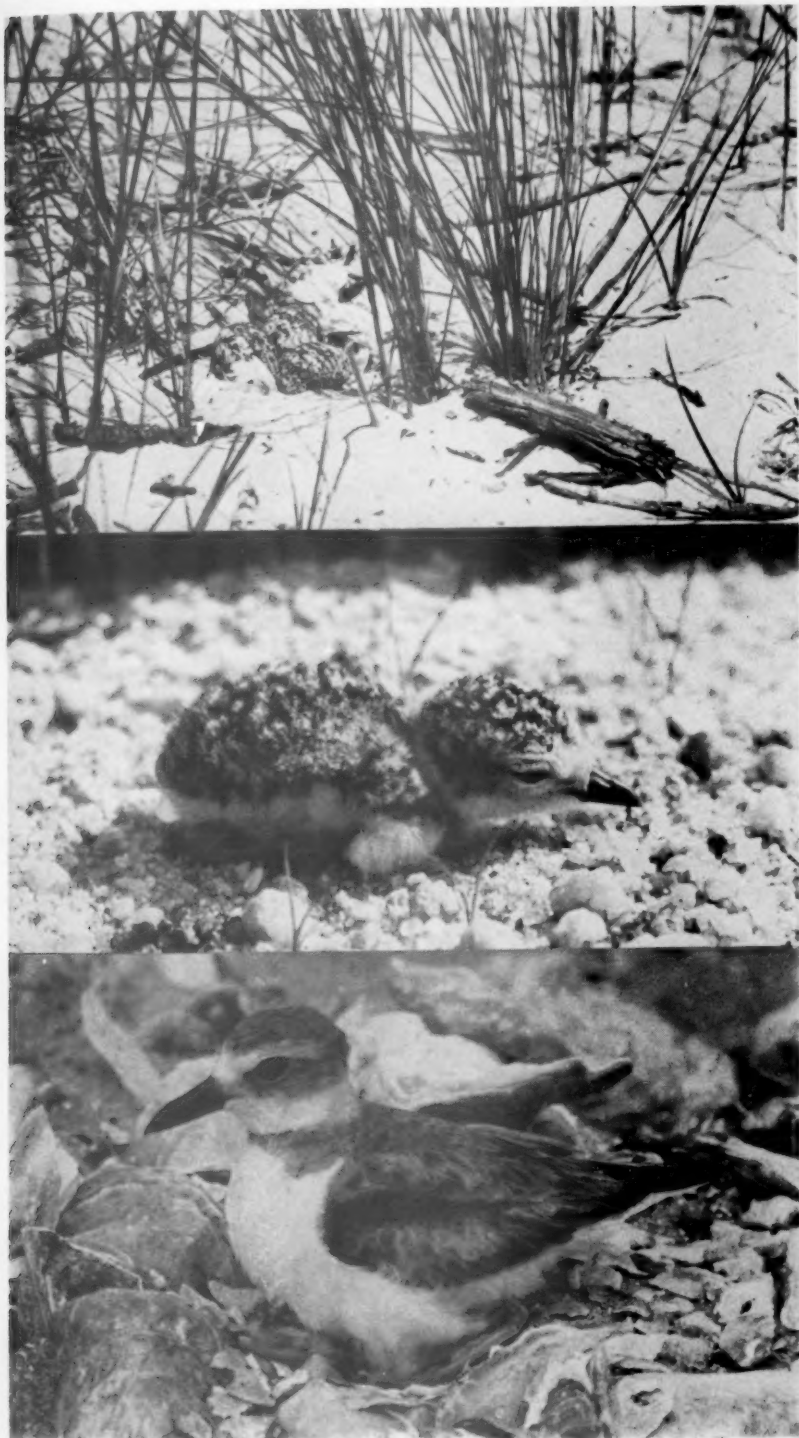
When a female exhibiting the injury-feigning behavior comes near a male, he is quite likely to run at her and drive her away. Her display is similar in some respects to the scrape-making of the male, and possibly it brings from him the same reaction that such behavior would if done by another male in courtship competition or territory establishment.

Palmer (1941: 48) has described the behavior of the Common Tern (*Sterna h. hirundo*). He thought it probable that sex recognition was dependent on the reaction of a bird when attacked by a male on territory. A male so attacked would either fight or depart, while a female would neither fight nor leave the territory. The male Wilson's Plover does attack a displaying male that either fights or leaves, but the sexually mature female spreads her wings before him and does not leave. We humans recognize the sexes of this species by the morphological character of the colored neck-band, but it is by no means certain that the male bird uses the same character. Nevertheless, I am unable to say what system of sex recognition is used by the species.

Two days after the fight described above, a male (probably the same one) defended the same knoll, even driving away a neighboring female and a male that merely came too close. I saw no sign of his mate.

One nest, at about the middle of the incubation period, was visited five consecutive times when only the female was present. On the sixth day the male also was present. The reactions of the female to my approach were the same every day. She came to meet me, circled over or ran nearby as long as I was within about 125 yards of the nest, but did not follow me beyond that distance. At the time there were no other plovers nesting in the vicinity, but after a few days another pair established themselves nearby and both were usually to be found in a territory which adjoined that of the first pair, about 150 feet from the nest. They joined the first female in nest-defense and ran through her territory with no protest from her or her mate, possibly because of my intrusion.

Where there are a number of plover nests in the vicinity, concern



WILSON'S PLOVER: (Upper), Nest in *Spartina patens*. (Middle), Young a day or so old. (Lower), Adult covering two newly hatched young and one unhatched egg.



about an intruder tends to hold in abeyance the territorial jealousy of the birds, and a group will follow the intruder through the colony for some distance. In such a group, there are usually more males than females, which appears to indicate that the female is more likely to remain in the immediate vicinity of the nest, at least during the time of incubation. Although a plover territory is seldom much smaller than a circle roughly one hundred feet in radius, in one case eighteen birds collected nearby as I moved through a colony.

Some interesting information furnished by Mr. S. A. Grimes seems to bear out my belief that the female has a measure of dominance at the nest. He has watched the birds many times as they returned to the nest after being flushed, and has found their behavior always the same. After an intruder has passed near the nest and caused the birds to leave it, they soon move back into the territory and run here and there, while the female often feigns interest in a likely nest situation, much as though she were settling on the eggs again. After some time there, she runs at the male, putting him to flight, then turns and goes directly to the nest and settles upon it. Naturally the male is fully acquainted with the position of the nest. What other meanings this behavior may have, I do not know.

Selection of the nesting site.—After the pair is formed and the birds have settled on their territory, there is a 'nest-location' ceremony, if one may call it that, quite of the general plover pattern. It serves the purpose of getting acquainted with every ground feature of the territory, aside from any possible social value it may have.

On April 15, 1942, I watched a pair of plovers for nearly an hour. This pair had a territory about 150 feet in radius, and was without territorial pressure from the boundaries. There was no competition from any other plovers and the courtship (pair-formation) time was past for them. They stayed in the territory the whole time I watched them and were present the next day. Suitable habitat existed much farther out, but it was evident that the male had no intention of going beyond the set boundaries.

The male would puff the neck-ring and the breast feathers and run on ahead, much as in the courtship ceremony. He would choose a nest site and settle in it, lift his wings slightly, tip his bill and tail upward 30 degrees from horizontal, and utter a throaty note. The female would run to him at once, whereupon he would step out of the nest site, lift his wings slightly, tip his bill downward, and give a soft note that, at fifty feet, sounded like a distant dove or frog. If the female did not step into the place he had selected, he would soon

run on elsewhere and repeat the performance. The female always ran to him when he chose a spot and called. Once, when she stood facing away from him, about two feet from the site he had picked, he stepped up behind her, trampling as in the pre-copulation ceremony. When she did not crouch, as does a female ready for copulation, he stopped trampling and went on to another place. Once she stepped into the site he had selected, and partly crouched. He spread his wings and started to tread, but they did not copulate at this time. The next day both were quietly resting on the territory, and when they flew off to the adjacent marsh to feed, I found a well-prepared nest hollow.

One possible significance of scrape-making in courtship is that it may be a substitute for the offering of food as practiced by those species given to courtship feeding. The origin and meaning of the practice of courtship feeding is still obscure, but in many species it is an integral part of the pairing ceremony and continues well into the incubation period. The Black Skimmer (*Rynchops nigra*) male brings food to his mate on the nest, and often mounts her back for a moment of wing-waving before he leaves. The Least Tern (*Sterna antillarum*) offers food to his mate before copulation, and giving it appears to be an indispensable part of the pre-copulation behavior. Similar behavior has been reported in many other species.

Pettingill (1937: 238) has written of the male Black Skimmer offering a stick to his mate, apparently in lieu of food not at hand. The male Wilson's Plover does not, to my knowledge, ever bring food to his mate, but he does offer a nest site in the scrape-making performance. Obviously he cannot bring to her the nest he likes, so must go near her and pick the best one available there. After the pair is formed and the female follows her mate, he can then offer her, in turn, the various suitable nesting places in his domain, and if she accepts them it is an indication that she is ready for the actual mating. On the other hand, the squatting of a male in another's territory causes the owner to defend it, because he will not tolerate any offer of seduction there.

Incubation and care of the young.—The female appears to take a large share of the incubation duty, but the male is sometimes found on the nest. One male hovered eggs that were hatching, but was shier of my camera than was his mate. How the female obtains food while incubating is not certain, but there is no evidence thus far of the male bringing food either to his mate or to the young, so probably she leaves the eggs long enough to hunt her own food. If fiddler

crabs are a staple article of diet, she need not go far nor stay long at a time. Prior to the laying of the eggs, the pair leaves the territory together for near-by feeding grounds where crabs, crickets, and similar food are plentiful.

Forbush (1929: 472) thought that the young of the Piping Plover (*Charadrius melodus*) were never fed by the parents, but were able to obtain their own food within twenty-four hours after hatching. The young birds have an egg-tooth that disappears very quickly, perhaps in less than a day after hatching. They leave the nest very soon, and probably do not return to it after it is once abandoned.

Mr. S. A. Grimes has written me that he observed a young plover run out of the nest to hide in the pickleweed whenever the brooding bird left it and an unhatched egg, but when the parent bird returned to brood, the chick crept out of the weeds and returned to her. I once watched a nest with two newly-hatched young and a pipped egg, nearly an entire Saturday afternoon, but the young ones made no attempt to leave the nest. Sometimes the male returned to brood them, but oftener the female came. On Sunday morning, the third bird was still struggling to get out of the egg. About noon we left the nest for an hour and, on returning, found that the three young birds had left the nest. Even the egg shells were gone. It appears that the act of leaving the nest is at the insistence of the parents.

The sturdiness of a day-old plover is remarkable. It stands up on its long legs, looking very like its parents, and runs rapidly to get away from an enemy. Like most precocial birds, the young plovers have a 'crouch-concealment' that is quite effective.

One litter was hatched on an island of habitat, that was surrounded by high marshes and that was several times as large as the two territories it then contained. The family stayed there for at least twenty-one days after hatching. By that time the young birds could fly very well and, when followed, would fly off to the shelter of the marsh-grass edge, while the parents moved on in the open before me. Open ground on which to run and to learn to feed and fly is of much value—perhaps a necessity—to the young birds, particularly so if it is true that they must find all their own food.

Injury-feigning and other behavior.—The injury-feigning behavior is very commonly seen in the colony at any time after there are eggs in the nest. The display is very like that of the Killdeer (*Oxyechus v. vociferus*) pictured in Nature Magazine (1940: 153–154). The female Wilson's Plover utters a guttural note, spreads her tail, and beats one or both wings on the ground as she creeps or runs along. She

abandons the pose in one place to run or fly to another and repeat. For some time it seemed that this was done only by the female, but more careful observation proved that the male also does it, though in lesser degree. This behavior, which probably follows an inherited pattern, appears to be followed whenever and to whatever degree the bird desires. There is a vague resemblance to the scrape-making of the courting male, to the display of a male in territory establishment that sets off a fighting reaction in another male, and to the posture of the female ready for copulation, yet I have no reason to think the resemblance more than fortuitous.

Certain acts are associated with definite procedures and with fairly definite reactions in other individuals, and may be described rather recognizably. Some of these acts have appeared to be used in more than one situation, although there is a chance that slightly different displays have been confused. Four such acts are listed here. More ample descriptions will be found elsewhere in this paper.

1. The courtship posture.—This is used by the male in the pair-formation and in territory establishment.

2. Scrape-making.—Three uses of this by the male have been noted. First, it is used in pair-formation; second, in nest-location on the territory; and third, it appears to incite territorial fighting when done by a male in territory claimed by another male. In this latter use, an abbreviated or conventionalized form may be used.

3. Trampling.—Used by the male before copulation.

4. Injury-feigning.—Performed mostly by the female, sometimes by the male, at any time after eggs are laid and until the young are fairly well developed.

Only three notes can be listed in like manner, with some certainty of the situations in which they are used:

1. The clear *peet* of the male appears to be the plover song, the declaration of territory established, though it is also given by a male solicitous over the safety of young, both on the ground and awing.

2. The low 'dove' note used in the nest-location behavior, evidently a call of the male to the female.

3. A harsh guttural note used in injury-feigning.

I regret the lack of exact information of the uses of these and other notes.

After reading the accounts of the behavior of other species of the family Charadriidae, it appears that much of the courtship behavior is quite similar throughout the group. Several accounts are quoted here from different observers, as compiled by Bent (1929).

Jourdain (*in Bent*, p. 145) recounts that the Lapwing (*Vanellus vanellus*) is a social bird, several pairs of which nest close to each other. They have a scrape-making act in the ritual of courtship. The males have encounters much like the territory fights of the present species.

Townsend (*in Bent*, p. 218) describes a posture used by the Semipalmated Plover (*Charadrius semipalmatus*) in its courtship, which might well have been written of Wilson's Plover.

The action of the Ringed Plover (*Charadrius hiaticula*) advancing toward a male as described by Selous (Jourdain, *in Bent*, p. 230), seems comparable to the treading described in this paper. Stanford (*in Bent*, p. 230) writing of the same species, tells of posturing by the male that is very similar to that of the present species, and also cites scrape-making.

In the case of the Piping Plover (*Charadrius melodus*), Tyler (*in Bent*, p. 237) tells of similar posturing as well as scrape-making.

No one could give much time to this species without realizing that it is an excellent subject for study. Its life from earliest spring until the young leave the nest, is spent out in the open. The sexes are easily distinguished, and it may be found nesting in colonies where its reaction to others of its kind may be observed, as well as in isolated pairs where complications caused by too close neighbors do not exist. One needs only a good pair of eyes, perhaps aided by binoculars, plus a high resistance to the sun, to see much that goes on in plover life. Elaborate blinds or equipment usually are not required.

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SOME ALASKAN NOTES

BY IRA N. GABRIELSON

(Concluded from p. 130)

CALIFORNIA MURRE, *Uria aalge californica* (Bryant).—This was probably the most abundant species observed on the trip. We did not see California Murres until we reached Seward (June 10) where there was a large colony associated with the still more numerous Pacific Kittiwakes. The deep water at the base of the cliff allowed us to drift the boat close and in the clear depths we could see the birds literally flying under the water as expertly as fishes. Often they came to the surface, saw the boat, and instantly dived again.

The great colonies of the Semidis and Kagamil Island were the largest, composed largely or entirely of this species. In the former island group, whenever we approached the precipitous cliffs closely enough to see distinctly, we found every available shelf and nook crowded with murres. At Kagamil Island we traveled in the 'Brown Bear' for at least two miles along cliffs similarly occupied, and the water was covered with birds.

These were two of the most impressive of the bird colonies seen on the trip. On Bogoslof Island an almost equally large concentration of murres contained both this species and the next.

PALLAS'S MURRE, *Uria lomvia arra* (Pallas).—This northern species was first found on Bogoslof Island (June 24).

At St. George Island (July 3) and St. Paul Island (July 4-6) Pallas's Murre was common, while at Walrus Island (July 7) the enormous murre colony was comprised largely, if not entirely, of this species. I saw only one bird there that I thought was a California Murre and it moved away before I could be sure. Pallas's Murre was abundant also at St. Matthew Island on July 8 and 9.

PIGEON GUILLEMOT, *Cephus columba* Pallas.—The Pigeon Guillemot was widely distributed but never in great numbers. It was first seen at Portage Bay (June 4) and was noted throughout the trip along the Alaska Peninsula and through the Aleutians.

MARbled MURRELET, *Brachyramphus marmoratus* (Gmelin).—A Marbled Murrelet found dead on the street in Ketchikan (June 3) was the first one noted in Alaska. The species was common at Petersburg and Portage Bay (June 4), and was particularly abundant in Glacier Bay and adjacent waters (June 7). A number were noted and one collected in the upper end of Iliamna Lake. It was common in Prince William Sound (August 10), and around Sitka (August 12).

On August 13, at Little Port Walter, a single juvenile was found above the weir apparently unable to get out; it remained all day and dived away from us across the pool whenever we approached.

ANCIENT MURRELET, *Synthliboramphus antiquus* (Gmelin).—Undoubtedly Ancient Murrelets were present among the thousands of birds noted at distances too great for certain identification, but they were definitely recorded on only four occasions—all but one in the Aleutian Islands. Two were seen close to the boat in Tanaga Bay (June 27), two others at the Ogluga Island on the same day, and ten or more on the west side of Atka Island on June 30. A single bird allowed our boat to approach closely about forty miles off St. George Island on July 3.

CASSIN'S AUKLET, *Ptychoramphus aleuticus* (Pallas).—Several times auklets, which were almost certainly of this species, were seen about Kodiak Island and in the Aleutians, but the only positive identifications were made in Salisbury Straits on August 12 and around the south end of Baranof Island on August 13.

PAROQUET AUKLET, *Cyclorhynchus psittacula* (Pallas).—We saw auklets in the Shumagins that we were reasonably sure were of this species, but the first observed at close range were at Chagulak (June 20) where there were numbers inhabiting the same rock slide with a much greater colony of Crested Auklets. The species was present in small numbers on Amukta (June 25), and on Kasatochi Island (July 26). St. George Island (July 3) had a great number of Paroquet Auklets but they were relatively inconspicuous in the incredible masses of Least and Crested Auklets that swarmed over and around the island. They were much more evident in the smaller colonies on St. Paul (July 4-6), and were almost lost again among the great hosts of murres and gulls on Walrus Island (July 7).

Paroquet Auklets were the most abundant auklet on St. Matthew Island and Pinnacle Rock (July 8-9), considerably outnumbering the other species in the parts of those islands that we explored.

CRESTED AUKLET, *Aethia cristatella* (Pallas).—This striking species, whose general outline and carriage are so much like those of the California Quail, was first seen at Chagulak Island (June 25) which harbored a large colony. We saw enormous swarms of auklets, many of them of this species, off Koniui Island (July 26) where large colonies are known to exist. The greatest auklet colony we visited in the Aleutians was that on Kasatochi Island (June 26) where the present species was second in abundance.

Off Tanaga Island, a sea otter made several half-hearted attempts

to catch one of two Crested Auklets sitting on the water near the kelp beds. The otter's efforts did not seem to bother the auklets as they merely flew a few yards and settled down again.

On St. George Island (July 3) this species was second in abundance in the great bird assemblage and it was common on St. Paul (July 4-6) and fairly abundant on St. Matthew (July 8).

LEAST AUKLET, *Aethia pusilla* (Pallas).—These tiny seafoal were unbelievably abundant in some places. We were in two of the largest colonies and passed close by a third. Gray says that farther to the westward in the Aleutians there are other great auklet colonies in which this species furnishes a dominating element.

The first Least Auklets we saw were conspicuous in the great swarms of birds found to the north of Koniuji Island on June 26. We visited a major colony at Kasatochi Island (June 26) and the greatest of all at St. George Island (July 3). In addition to these vast concentrations we saw numbers of the birds in small flocks at Tanaga. The species was common on St. Paul Island and also on St. Matthew Island. While watching a great mass of Pallas's Murres on Walrus Island (July 7), something faintly incongruous in the landscape attracted my attention. It was a single Least Auklet sitting solemnly on a small rock amid the thousands of larger birds. It was the only one noted on that island.

So few naturalists have been privileged to observe these great Alaskan bird concentrations that a reproduction of my notes on two of them may be justified. On Kasatochi Island the great attraction was the auklet colony made up largely of this species and the Crested Auklet. This island is a mountain peak rising abruptly from the water, so precipitous, in fact, that in only a few spots where slide rock has weathered off the cliffs or broken their sheer faces is it possible to ascend. We made a somewhat precarious landing at the base of one of these slides and slowly worked our way upward. My notes on this occasion are as follows:

"I climbed a rock slide trying to collect one of the Aleutian wrens but, failing to get within range, sat on a rock and watched the show put on by the auklets. There were three species, the Least Auklet by far the most abundant, with the Crested Auklet second in numbers, and the Paroquet Auklet represented by a few pairs. Scattered pairs of Tufted Puffins also were present. Gray says that in 1936 this island had a large puffin colony and attributes its decrease to the introduction of blue foxes on the island."

(Note: This is one of several bird islands from which the foxes are being removed. As we saw three foxes on the one slide and as there are neither beaches from which the foxes may obtain sea food or rodents, it is evident that the foxes are entirely dependent for food on the bird population.)

"From the loose rocks of this slide came a great medley of chatter and clucks. The louder, coarser notes were those of the Crested Auklet, which looks like a red-billed quail. They talk among themselves exactly as do quail coveys. The Least Auklets have a softer voice, but they, too, chatter incessantly in the slides.

"The Crested Auklets predominated in numbers at the bottom of the slides while the Least were most abundant in the smaller rocks toward the top.

"As the birds leave the nesting crevices, they walk out to a rock that is in the clear and pitch off. Aviators might well have watched these little sea fowl perform to get the idea of power diving. That is exactly what they do. They dive from the rocks with wings working at top speed, pitching straight down the slopes. By the time they reach the water and flatten out to dart away over the sea they have attained terrific speed. The wings of the two species whistle in different tones as they dive, that made by the Crested Auklet being deeper. As the birds straighten out over the water, they occasionally rock from side to side as I have seen quail do at high speed. Sometimes in the dive they sideslip—behaving as do teal and other small ducks pitching down from a height.

"As evening advanced, the flocks of Least Auklets, with a few of the larger crested species often intermingled, increased in size until the clouds of individuals were like the great blackbird swarms of the Middle West and Gulf Coast. These flocks circled and swirled as ribbons and drifts of black, or occasionally white, smoke on the skyline or as shadows over the water, twisting and turning in fantastic figures.

"When one of the flocks swerved in over the rock slide the roar of wings was almost deafening. The bulk of the birds swept back out to sea but dozens out of each flock dropped like falling leaves to alight on the rocks near their particular domiciles.

"Some, seeing me, immediately took off again. Others would look me over, cocking their heads first to one side and then to the other, before finally deciding that I was unimportant. When that decision was made they went about their business, which consisted of posing on the rocks or strutting about a bit, like half-grown quail, before popping into their holes. The absurd gravity of the Least Auklets, with their spotted coats and big eyes, made apparently bigger by the scattered, stiff, white feathers about the head, was one of the most amusing traits noted in a lifetime of bird watching.

"As these swarms of birds maneuvered over the water in intricate patterns, the synchronization of their movements compared favorably with that of the apparently well-drilled sandpipers. Sometimes thousands of birds in a single flock alternately flashed white or black in the setting sun."

At St. George, which is a comparatively low island, the auklet colonies were mostly concentrated on a long, low volcanic ridge back of the village. This site, however, harbored by no means all of the birds, which were everywhere we went; it merely was the greatest assemblage. Undoubtedly I saw here the greatest number of living birds in the air and on the water that I ever saw in one day. My notes for St. George are as follows:

"July 3. When I went up to the pilot house about 7 a. m. we were about fifty miles from St. George. Fur seals were scattered over the comparatively calm sea and murres and red-legged kittiwakes began to appear in small numbers. . . .

"I noted one Ancient Murrelet about forty miles off shore at about the time the first Tufted and Horned Puffins were observed. As we neared the islands the number of birds, both in species and individuals, increased. Paroquet, Least, and Crested Auklets appeared in the order named, and by the time we were within three miles of shore the Least Auklets outnumbered all others combined. Many birds of the year were among them, a fact verified by collecting one.

"We landed about 2 p. m. Over the last mile of water the Least and Crested Auklets had been swirling like swarms of insects. As we landed, the air over the village was filled with hurrying flocks. When we reached the little hill on which the buildings stand, a long, low ridge was exposed to our view and the air between us and the ridge, as well as that over it, was filled with circling, swirling thousands of birds. Auklets constantly flying over the village to join the milling throngs were mostly Leasts but there were many Crested and a few Paroquets among them. All the afternoon, hastening bands from all directions joined the circling hosts. When one remembers that the sea for miles out had been dotted with them, and the air over it filled with great swarms, drifting like shadows over the surface of the water, some idea of the immensity of the population may perhaps be obtained. The occasional endless processions of Sooty Shearwaters on the Oregon coast, the blackbird clouds of the Mississippi Valley, and the myriads of waterfowl on some of the greatest concentration areas are the only things in my experience that even remotely compared with these auklet hosts.

"Mr. Mandeville, the acting superintendent, told us that in spring the natives make nets on hoops, about the size of a barrel hoop, to catch these birds for food, as they fly over the edges of low bluffs. He said that one boy sometimes catches as many as a hundred a day. When one reflects that the auklets are literally whizzing projectiles, such a feat seems impossible until the numbers present are taken into account.

"The natives also collect the eggs. Three of us went through a colony trying to locate downy young. We found shells of recently hatched eggs but no eggs nor downies. The comical Least Auklets sat around on the rocks, ogling us owlishly as we dived for nests. They seemed entirely unconcerned and they proved to be right. All that we accomplished with our rock-rolling effort was a slight disturbance of the landscape. We finally gave it up and concluded that our combined egg-hunting intelligence quotient was considerably below that of a ten-year-old native boy."

WHISKERED AUKLET, *Aethia pygmaea* (Gmelin).—Two members of the party, Jackson and Tripp, came in from the trip across Atka Island (June 30) saying they had found a live "dickey bird" in the trail and caught it. As one of the party had brought in a newly-fledged Alaska Longspur a few days before, I expected something similar and was surprised when they produced our first specimen of this, the most local and least known of the Aleutian Island auklets.

On July 1, we saw several hundred in the waters between Carlisle and Kagamil Islands and along the great cliffs on the latter island. Their behavior on the water and in the air did not differ from that of the other species.

RHINOCEROS AUKLET, *Cerorhinca monocerata* (Pallas).—We identified this bird with certainty only twice. We saw between twenty-five and thirty birds just outside of Cape Spencer as we started north across the Gulf of Alaska (June 7). They were mostly in pairs and the breeding plumes were conspicuous. As we came south over the Gulf of Alaska (August 12) we observed a number as we neared Salisbury Straits on the run into Sitka.

HORNED PUFFIN, *Fratercula corniculata* (Naumann).—This small puffin, though widely distributed, was never present in large colonies, and in fact was usually seen in smaller numbers than its larger relative. The first seen were a few pairs near Seward (June 10). We also saw scattered individuals on the waters about Kodiak Island. In the Semidis, Horned Puffins were more abundant, equalling or perhaps exceeding the Tufted Puffins observed. The birds were coming and going out of nest burrows along the tops of the cliffs but there was no great concentration of them in any one spot. From the Shumagin Islands west and north the Horned Puffin was usually the more abundant of the two.

TUFTED PUFFIN, *Lunda cirrhata* (Pallas).—This was one of the widely distributed water birds, being found about most of the rocky islands visited. It was first recorded when scattered individuals were seen just outside Cape Spencer (June 7). We saw small nesting colonies scattered from the Barren Islands (June 13) to the Pribilofs.

NORTHWESTERN HORNED OWL, *Bubo virginianus lagophonus* (Oberholser).—Two horned owls, taken by Collins and O'Connor, agents of the Alaska Game Commission, on June 26 along Willow Creek, north of Anchorage, and put into storage for me, proved to be of this form.

AMERICAN HAWK OWL, *Surnia ulula caparoch* (Müller).—Two individuals near Fairbanks on August 4 were to be the only ones noted during the summer.

RUFIOUS HUMMINGBIRD, *Selasphorus rufus* (Gmelin).—Two were seen near Petersburg on June 4.

WESTERN BELTED KINGFISHER, *Megaceryle alcyon caurina* (Grinnell).—Single birds were noted at each of three places—Petersburg (June 4), Yakutat (June 8), and Little Port Walter (August 13).

NORTHERN FLICKER, *Colaptes auratus luteus* Bangs.—Woodpeckers of all kinds proved to be scarce although a careful lookout was maintained for them in wooded country. This flicker was noted as follows: one at Yakutat (June 8), two along Susitna River near Curry (August 2), three near Fairbanks (August 4), two along Steese Highway (August 6), and five along Richardson Highway (August 9).

NORTHERN RED-BREASTED SAPSUCKER, *Sphyrapicus varius ruber* (Gmelin).—Three birds near Petersburg (June 4) and one at Portage Bay on the same day were the only ones observed.

SITKA HAIRY WOODPECKER, *Dryobates villosus sitkensis* Swarth.—Single birds, one each at Petersburg and Portage Bay on June 4, were the only hairy woodpeckers seen.

BATCHELDER'S WOODPECKER, *Dryobates pubescens leucurus* (Hartlaub).—A single downy woodpecker, presumably of this form, was seen on the shores of Tustamina Lake (July 30). It was not taken, so the subspecies cannot be positively stated.

SAY'S PHOEBE, *Sayornis saya saya* (Bonaparte).—Say's Phoebes were seen only twice, as single birds on Kalgin Island on July 28 and near the Richardson Highway on August 9.

OLIVE-SIDED FLYCATCHER, *Nuttallornis mesoleucus* (Lichtenstein).—A single bird was noted south of Paxton Lake along the Richardson Highway on August 9.

PALLID HORNED LARK, *Otocoris alpestris arctica* Oberholser.—This pale race of horned lark was not common in the territory visited. About a dozen individuals were seen above timber line in Mt. McKinley Park on August 3 and about the same number were found along the Steese Highway halfway between Fairbanks and Circle on both August 6 and 7.

VIOLET-GREEN SWALLOW, *Tachycineta thalassina lepida* Mearns.—Although noted at intervals, swallows were not usually common. Four of this species were seen in Petersburg (June 4) and a like number, or slightly more, were constantly about the buildings at Cooper Landing on the Kenai River (June 11–12).

TREE SWALLOW, *Iridoprocne bicolor* (Vieillot).—Tree Swallows were among the more abundant representatives of the family. The first seen were two flying about over the Situk River (June 8) near the fisheries cabin. The species was not noted again until we reached Dillingham (July 17) where it was rather common not only about the town but over the river and adjoining tundra. It was also common on the lakes at the head of Wood River (July 18). A few individuals were observed over Brooks Lake (July 20) and a single bird flew about Stevenson's Road House on Iliamna Lake (July 24).

The only concentration of swallows was seen on July 30 about a mile north of Tustamina Lake. Here a large birch tree standing somewhat isolated in an open flat was filled with a mixed group of Tree and Bank Swallows. There were several hundred birds in the tree or flying about it.

BANK SWALLOW, *Riparia riparia riparia* (Linnaeus).—This species was first recorded when two birds were seen flying about the fish weir on the Karluk River on Kodiak Island (June 17). Five individuals were circling about an abandoned cannery at Chignik (June 19) and the species was fairly common on the shores of Morzhovoi Bay (June 21). Several were observed at Dillingham (July 17) and on Wood River Lakes (July 18). It was fairly common at Brooks Lake (July 21), Becharof Lake (July 21), and on the Kasilof River (July 29). About a dozen birds were flying about a bank filled with Bank Swallow burrows at Kenai Village (July 28) but none of the birds was observed to enter or leave the burrows. Bank Swallows made up about half of the concentration at Tustamina Lake on July 30, noted above.

BARN SWALLOW, *Hirundo erythrogaster* Boddaert.—The first bird I saw at Wrangel (July 3) as I stepped from the boat was a lone Barn Swallow flying over the street. At Petersburg, the next day, the species was the most conspicuous bird; as many as fifteen were in sight at once. Three birds were seen at Juneau (June 5) and a pair was flying about an old trapper's cabin on the shores of Glacier Bay (June 7). Two were noted at Yakutat (June 8) and the species was not seen again until July 21 on Ugashik Lake where a similar number was present. About a dozen birds were about Sieverson's Lodge on Iliamna Lake during our stay (July 24–25).

ALASKA JAY, *Perisoreus canadensis fumifrons* Ridgway.—Three Alaska Jays were observed (one adult and two fully fledged young) on the Kenai River (June 11), and two were about the fisheries camp at Brooks Lake (July 20). There were some ten birds about a cabin and clearing on the Kasilof River (July 29) where we spent an hour waiting for the tide to rise sufficiently for us to get over a sand bar. Two were present each morning about our cabin on Tustamina Lake (July 30–31). The species was common in Mt. McKinley Park (August 2 and 3) and along the Steese Highway on August 6. At Circle, eight came to one tree as I 'squeaked' at a group of sparrows in a thicket.

STELLER'S JAY, *Cyanocitta stelleri stelleri* (Gmelin).—Several were seen in and about Juneau on June 5 and 6. One was taken by me on the 6th and one by Dufresne at Cordova on June 10.

AMERICAN MAGPIE, *Pica pica hudsonia* (Sabine).—The Magpie was a conspicuous and fairly common element in the avian population of Kodiak Island, the Shumagin Islands, and the base of the Alaska Peninsula.

NORTHERN RAVEN, *Corvus corax principalis* Ridgway.—The Raven was widely distributed but not common and my notes do not record more than five in any one day.

On Bereskin Island I watched a young Raven just learning to fly. An empty nest on the cliff below indicated its probable, late home. This bird took off from the edge of the cliff in the face of a strong breeze on somewhat uncertain wings, flew out a few yards and then turned back to alight again. This feat was repeated a score of times.

At Tanaga Island my attention was attracted to an Arctic Tern's nest by the frantic cries and dives of the parent birds, obviously agitated by something behind a big rock. As I stepped around it, a Raven flushed from within a few feet of the terns' nest containing two eggs.

NORTHWESTERN CROW, *Corvus brachyrhynchos caurinus* Baird.—Crows were present in small numbers. The first land birds seen on the trip was a flock of about twenty crows flying over the harbor as we came into Ketchikan (June 3). There were also a number about Petersburg, Juneau, Kodiak Village, and Karluk.

LONG-TAILED CHICKADEE, *Penthestes atricapillus septentrionalis* (Harris).—Three or four chickadees were noted about the cabin on Tustamina Lake (July 20).

YUKON CHICKADEE, *Penthestes atricapillus turneri* Ridgway.—A single bird collected in an alder thicket on the mountain above Larsen's Bay, Kodiak Island (June 17) proved to be of this form.

COLUMBIAN CHICKADEE, *Penthestes hudsonicus columbianus* (Rhoads).—Columbian Chickadees were collected at Kenai Lake (June 12), Kodiak (June 14), Tustamina Lake (July 31), and at Brooks Lake (July 19) on the Katmai National Monument.

CHESTNUT-BACKED CHICKADEE, *Penthestes rufescens rufescens* (Townsend).—Chestnut-backed Chickadees were noted at Portage Bay (June 4) and Little Port Walter (August 13).

CALIFORNIA CREEPER, *Certhia familiaris occidentalis* Ridgway.—A female collected at Portage Bay on June 4 proved to be of this form.

DIPPER, *Cinclus mexicanus unicolor* Bonaparte.—A single bird was noted on Wood River on July 18.

ALASKA WREN, *Nannus hiemalis alascensis* (Baird).—Five individuals of this form were seen and one was collected on St. George Island on July 3.

TANAGA WREN, *Nannus hiemalis tanagensis* Oberholser.—Eight or ten individuals of this subspecies were seen on Tanaga Island (June 27) and a like number on Atka (June 30). A single bird was collected on the latter island. In addition, specimens of this and other forms were taken at Chagulak, Kasatochi, Oogliuga, Amchitka, and Carlisle islands.

This tiny wren—the smallest land bird of these gloomy islands—is

quite abundant in places. It is confined largely to the rocky beaches and immediately adjacent areas and was seldom noted more than a hundred yards from the water's edge. Its clear, bubbling song was always a welcome sound.

SEMIDI WREN, *Nannus hiemalis semidiensis* Brooks.—Three birds were seen on Choweit Island (June 18).

KODIAK WREN, *Nannus hiemalis helleri* (Osgood).—A single specimen was collected on Afognak Island (June 13).

WESTERN WINTER WREN, *Nannus hiemalis pacificus* (Baird).—Winter Wrens were noted at Petersburg (June 4), Yakutat (June 8), and Port Walter (August 13).

EASTERN ROBIN, *Turdus migratorius migratorius* Linnaeus.—Robins were common and widely distributed on the mainland from the Kenai to the base of the Alaska Peninsula. A few birds also were present along the Litnik River on Afognak Island (June 15). The robin was often common on the tundra where the plentiful supply of berries furnished an easy living.

NORTHWESTERN ROBIN, *Turdus migratorius caurinus* (Grinnell).—This race was observed at Petersburg (June 4), Portage Bay (June 4), Juneau (June 5), and Glacier Bay (June 7).

PACIFIC VARIED THRUSH, *Ixoreus naevius naevius* (Gmelin).—Noted at Petersburg and Portage Bay (June 4), Juneau (June 5), Glacier Bay (June 7), and Yakutat Bay (June 8). Barely-fledged young were seen at the last place.

NORTHERN VARIED THRUSH, *Ixoreus naevius meruloides* (Swainson).—This race was noted at Afognak, Dillingham, Wood River, Tustamina Lake, Steese Highway, and Richardson Highway. It was one of the more common and conspicuous woodland birds. Young out of the nest, but still unable to fly well, were seen on Afognak. There is little difference in the breeding plumages of these two forms as seen in the field.

ALASKA HERMIT THRUSH, *Hylocichla guttata guttata* (Pallas).—Birds collected at Yakutat (June 8) and Kodiak (June 14) were of this form. Birds noted at Afognak (June 15), Chignik and Metrofania Island (June 19), Naknek (July 19), and Richardson Highway (August 9) probably belong here.

DWARF HERMIT THRUSH, *Hylocichla guttata nanus* (Audubon).—A bird collected at Juneau (May 5) by Greany is of this race.

RUSSET-BACKED THRUSH, *Hylocichla ustulata ustulata* (Nuttall).—Two individuals were seen at Portage Bay on June 4.

OLIVE-BACKED THRUSH, *Hylocichla ustulata swainsoni* (Tschudi).—

Several Olive-backed Thrushes were seen along the Steese Highway (August 6), and one was noted near Paxton Lake on the Richardson Highway (August 9).

GRAY-CHEEKED THRUSH, *Hylocichla minima aliciae* (Baird).—A male of this species was collected at Dillingham on July 18.

EUROPEAN WHEATEAR, *Oenanthe oenanthe oenanthe* (Linnaeus).—The Wheatear was one of the birds I hoped most to see in Alaska. I had gathered the impression that it was a rather uncommon species that one could expect to see only occasionally. I was delighted, therefore, to find it actually common in two widely separated localities. We saw numbers in Mt. McKinley Park on both August 2 and 3 and along the Steese Highway, about midway from Fairbanks to Circle, on both August 6 and 7. On August 8 we saw two more of these birds on the Richardson Highway just south of the Tanana River crossing.

In Mt. McKinley Park the Wheatears were in small flocks of six or eight to a dozen or more. They were feeding along the shoulders of the road and in action and behavior were much like pipits. Many spotted young were among them. We had a good opportunity to study several at close range as we sat on a rocky outcrop high in the mountain on August 3, watching a group of Dall's sheep. The Wheatears were all around us, sometimes within a few feet. In appearance, especially around the head and the breast, they resemble a female Bluebird; but when they flush, displaying the white in the tail, they suggest McCown's Longspur.

The flocks, and even individuals, have the trait of some other grassland birds of whirling off the ground, and mounting high into the air, apparently bent on getting out of the country, only to swerve and land again close to, if not upon, the spot previously occupied.

On August 6, the first one we saw was perched on the topmost twig of a spruce with its breast toward the car. In the early morning light the soft pink of the breast looked red enough for a Bluebird and we stopped the car and trained the glasses carefully upon it before we could be sure that our eyes were not playing tricks upon us.

KENNICOTT'S WILLOW WARBLER, *Acanthopneuste borealis kennicotti* (Baird).—A single bird, which I took to be of this species, flew ahead of us up a small stream on the north end of St. Matthew Island (July 9). One was collected at Dillingham (July 18), and a second specimen, one of three birds that were making a great disturbance over my presence near a small, dense willow, was taken at Brooks Lake (July 19). In general appearance these birds reminded me of Tennessee Warblers although they were more nervous and excitable than that species.

WESTERN GOLDEN-CROWNED KINGLET, *Regulus satrapa olivaceus* Baird.—A number of kinglets were noted at Portage Bay (June 4) and Juneau (June 5). Two were seen on Afognak Island on June 15.

EASTERN RUBY-CROWNED KINGLET, *Corthylio calendula calendula* (Linnaeus).—Kinglets were common at Kenai Lake (June 12) and a single bird was seen at Kodiak (June 14). There were four or five in one spruce tree on Tustamina Lake (July 30).

SITKA KINGLET, *Corthylio calendula grinnelli* (Palmer).—The Sitka Kinglet was in full song up to, and including, June 8. We saw it commonly at Portage Bay, Juneau, Glacier Bay, and Yakutat. I have a specimen of this race taken by Greany on May 5 at Juneau.

AMERICAN PIPIT, *Anthus spinoletta rubescens* (Tunstall).—Pipits were fairly common, many of them in the odd juvenile plumage seldom seen in the United States. A number were collected in the hope of getting representatives of Asiatic forms, but all proved to be of this race.

BOHEMIAN WAXWING, *Bombycilla garrula pallidiceps* Reichenow.—On August 3, in Mt. McKinley Park, Dufresne first discovered a group of these beautiful birds, consisting of adults and newly fledged young. A few days later (August 8 and 9), this proved to be one of the most common species along the Richardson Highway, with both adults and juveniles present. Their behavior was much like that of the Cedar Waxwing at the same season. These birds perched conspicuously in the tops of the small spruces and called softly to one another as we worked about in the timber to get better views of various individuals.

NORTHWESTERN SHRIKE, *Lanius borealis invictus* Grinnell.—This shrike was one of the conspicuous birds of the interior country. Like its more southern cousins, it showed a decided fondness for telephone wires and poles along the highways. It was seen at frequent intervals in Mt. McKinley Park (August 2–3), along the Steese Highway (August 6–7), and along the Richardson Highway (August 8).

ORANGE-CROWNED WARBLER, *Vermivora celata celata* (Say).—An Orange-crowned Warbler, probably of this race, was heard singing and was later seen on the lower Kvichak River on July 23.

LUTESCENT WARBLER, *Vermivora celata lutescens* (Ridgway).—Several were seen at Juneau (June 5) and two at Glacier Bay (June 7). They were common at Yakutat (June 8) and on the Kenai River (June 11 and 12). Specimens were collected at the last-named place.

ALASKA YELLOW WARBLER, *Dendroica aestiva rubiginosa* (Pallas).—This species was one of the two most common warblers observed on the trip well out onto the Alaska Peninsula.

BLACK-POLL WARBLER, *Dendroica striata* (Forster).—A pair was observed on a mountain slope above Kenai Lake (June 11), and one was collected at Dillingham (July 17).

GRINNELL'S WATER-THRUSH, *Seiurus noveboracensis notabilis* Ridgway.—Four or five birds were seen and one was collected along a little stream tributary to Tustamina Lake, on July 31.

NORTHERN PILEOLATED WARBLER, *Wilsonia pusilla pileolata* (Pallas).—This was the most widely distributed warbler and a number of specimens were collected.

RUSTY BLACKBIRD, *Euphagus carolinus* (Müller).—Several were seen at Dillingham (July 17) and a small number around the University of Alaska grounds near Fairbanks (August 5).

KODIAK PINE GROSBEEK, *Pinicola enucleator flammula* Homeyer.—Pine Grosbeaks were not common anywhere. A single male was seen by Dufresne in Yakutat Village (June 8). We saw three pairs on the Kenai, all in the vicinity of Kenai Lake (June 11 and 12). A single male was noted at Kodiak (June 14) and two were observed on Afognak (June 15). Two were seen from the train along the Susitna River (August 2).

Only two specimens were taken, one by me at Kenai and the other by Collins and O'Connor near Palmer on June 27, and held in cold storage until I reached Anchorage on July 31. Both of these specimens are of this race. The birds along the Susitna may have been of this race or of the more northern *alascensis*.

ALEUTIAN ROSY FINCH, *Leucosticte griseonucha* (Brandt).—This handsome finch was one of the real joys of the Aleutian and other islands. We saw it first on the Semidi Islands (June 18) where a dozen birds were present along the rocky backbone of Choweit Island. From that time on they were present in varying numbers throughout the points visited on the Aleutians, the Alaska Peninsula, and the islands of Bering Sea.

They were exceedingly abundant on St. George (July 3) and St. Paul (July 4-6). On St. George, a nest containing three eggs was found by Frank Beals. It was placed on a low cliff and was made of coarse grass stems, somewhat scantily lined with finer fibers. It was rather bulky—about six inches across—resembling a Catbird's nest but more loosely constructed. I was also shown a similar nest built in a tool house.

HOARY REDPOLL, *Acanthis hornemanni exilipes* (Coues).—Two very pale redpolls were seen on Nunivak (July 11) in a narrow band of willow of some two-foot stature but, nevertheless, the largest woody

plants we had seen for weeks. The next day I found about a dozen similar birds about a patch of slightly larger willows on Cape Vancouver, Nelson Island, and collected two which proved to be of this subspecies.

COMMON REDPOLL, *Acanthis linaria linaria* (Linnaeus).—This bird was very common about timber line on the Kenai and wherever there was a patch of alders or willows along the Alaska Peninsula or the shores of Bering Sea. It was also common in all places visited in the interior.

RED CROSSBILL, *Loxia curvirostra pusilla* Gloger.—A flock of about twenty-five Red Crossbills was seen high up above Kenai Lake in the edge of the timber on June 12.

SITKA CROSSBILL, *Loxia curvirostra sitkensis* Grinnell.—About a dozen birds of this form were seen at Portage Bay (June 4), and a somewhat larger number at Juneau (June 5). More than twenty-five were observed about the fishery laboratory at Little Port Walter (August 13).

WHITE-WINGED CROSSBILL, *Loxia leucoptera* Gmelin.—There were numbers of White-winged Crossbills along the Litnik River on Afognak Island (June 15). These birds were not in flocks but were scattered, in pairs or as individuals, over several miles of timber. They were common, distributed in the same way, on Kalgin Island (July 28) and in the timber north of Tustamina Lake (July 30).

WESTERN SAVANNAH SPARROW, *Passerculus sandwichensis alaudinus* Bonaparte.—This was one of the common land birds of the Territory. An effort was made to collect Savannah Sparrows at frequent intervals along the coast, and in the considerable series taken, all birds from Juneau to Chignik seem to be nearer to this form. From west of the latter point and through the Aleutians, as far as we found Savannah Sparrows, the specimens seem nearer to *sandwichensis*.

ALEUTIAN SAVANNAH SPARROW, *Passerculus sandwichensis sandwichensis* (Gmelin).—My birds from Sand Point, Shumagin Islands (June 20), and Morzhovoi Bay (June 21) were closer to this form as were all specimens taken west of these points. Several birds were seen on Metrofania Island but none was collected. It was somewhat of a surprise to me to find Savannah Sparrows common on Kagamil, Carlisle, and Amukta Islands, all points beyond what I had understood the range of the species to be. They were particularly numerous on Kagamil.

SLATE-COLORED JUNCO, *Junco hyemalis hyemalis* (Linnaeus).—Juncos were common above Kenai Lake (June 12) and among them were

bob-tailed fledglings. They were common in Mt. McKinley Park about patches of timber (August 2-3), at Fairbanks (August 5), and very common along all of the Richardson Highway below timber line (August 8-9).

OREGON JUNCO, *Junco oreganus oreganus* (Townsend).—Ten to twelve individuals were noted about the animal pens of the fur farm near Petersburg (June 4).

WESTERN TREE SPARROW, *Spizella arborea ochracea* Brewster.—Tree Sparrows, including many newly-fledged young, were common about Dillingham (July 18), Naknek (July 22), Iliamna Lake (July 24-26), Mt. McKinley Park (August 3), along the Steese Highway (August 6), and along the Richardson Highway (August 8-9). It was noted that these, as well as other sparrows and shorebirds, fed freely on the dried, last-year's berries of crowberry and blueberry with which the tundra was covered. As the new crop of berries began to ripen the birds switched from the dried to the fresh diet with the consequence that every chin had a reddish stain. This was noticed particularly in birds taken at Iliamna Lake.

GAMBEL'S SPARROW, *Zonotrichia leucophrys gambeli* (Nuttall).—Gambel's Sparrows were common on the Kenai, the Alaska Peninsula, and in the interior. The swarms of sparrows along the interior highways, of which this species was a large element, reminded me of early October days in Oregon.

GOLDEN-CROWNED SPARROW, *Zonotrichia coronata* (Pallas).—These handsome sparrows were common at or near timber line on the Kenai (June 11-12). They were also numerous on Barren Islands (June 13), Kodiak (June 14-16), and Afognak (June 15). West of Kodiak we saw a few at Chignik (June 19) and four birds on Metrofania (June 19). From here they are not again mentioned in our notes until we reached the first patch of willows on Nelson Island where, among the other birds in a square rod or two of brush, we found a single Golden-crowned Sparrow. It was also fairly common about Bristol Bay and Cook Inlet.

EASTERN FOX SPARROW, *Passerella iliaca iliaca* (Merrem).—Eastern Fox Sparrows were fairly common at Dillingham (July 17) and about the Wood River Lakes (July 18). They were also in numbers along the Richardson Highway south of Fairbanks (August 8).

SHUMAGIN FOX SPARROW, *Passerella iliaca unalaschcensis* (Gmelin).—These big sparrows were fairly common although not so abundant as the Kodiak race. Specimens of this form were collected at Semidi Islands (June 18), Chignik and Metrofania Island (June 19), Shumagin Islands (June 20), and False Pass (June 22).

KODIAK FOX SPARROW, *Passerella iliaca insularis* Ridgway.—Nowhere on the trip were Fox Sparrows so abundant as on Kodiak and adjacent islands where they were the most conspicuous land bird. Specimens of this race were collected at several localities.

VALDEZ FOX SPARROW, *Passerella iliaca sinuosa* Grinnell.—Fox Sparrows were as rare on the Kenai as they were common on Kodiak and I saw only a single bird above timber line near Kenai Lake (June 12), which I failed to collect. One of this race was taken about twenty-five miles north of Valdez on the Richardson Highway (August 9).

YAKUTAT FOX SPARROW, *Passerella iliaca annectens* Ridgway.—Fox Sparrows were also scarce about Yakutat. The only birds seen were three in the village on June 8.

TOWNSEND FOX SPARROW, *Passerella iliaca townsendi* (Audubon).—A skin presented to me by J. M. Greany, taken May 23 at Juneau, is of this race. I heard Fox Sparrows singing in Juneau on June 5 but failed to find them in the open country.

LINCOLN'S SPARROW, *Melospiza lincolni lincolni* (Audubon).—A single juvenile bird collected on the portage trail between Iliamna Lake and Cook Inlet provided our only record for this species.

ALEUTIAN SONG SPARROW, *Melospiza melodia sanaka* McGregor.—Song Sparrows in the portions of Alaska we visited were restricted to a narrow belt almost within sight of salt water. They were essentially birds of the rocky beaches, and the beach drift and rocks exposed by the receding tides were their chosen haunts. I made an effort to collect Song Sparrows whenever practicable in order to have definite locality records for the races. All Song Sparrows taken from the Semidi Islands westward were of this form.

BISCHOFF'S SONG SPARROW, *Melospiza melodia insignis* Baird.—Specimens referable to this race were taken at Barren Islands (June 13), Kodiak village (June 14), and Uganik Bay, Kodiak (June 16). In this area Song Sparrows were distinctly less numerous than Fox Sparrows, a condition that did not often prevail along the shore line.

KENAI SONG SPARROW, *Melospiza melodia kenaiensis* Ridgway.—Song Sparrows were very scarce on the parts of the Kenai that we visited, and the only representatives of this race taken were obtained on the Copper River Flats (June 10).

YAKUTAT SONG SPARROW, *Melospiza melodia caurina* Ridgway.—Only the birds taken at Yakutat Bay are referable to this race.

SOOTY SONG SPARROW, *Melospiza melodia rufina* (Bonaparte).—Birds collected at Little Port Walter (August 13) belong to this form.

RUSTY SONG SPARROW, *Melospiza melodia morphna* Oberholser.—

Birds taken at Portage Bay on June 4 seem to be closer to this form than to any other although they are not typical.

ALASKA LONGSPUR, *Calcarius lapponicus alascensis* Ridgway.—This was one of the species that varied considerably in abundance from one island to the next. It was first seen at Morzhovoi Bay, on June 21, where it was fairly common in the sand dunes and about Frosty Peak. Then only two birds, both males, were seen on Akutan Island (June 23). We did not see the species at all on Chagulak Island, but on neighboring Amukta (June 25) it was very common, probably exceeding in numbers all other passerine species combined. Here Frank Beals found one nest containing four eggs. Longspurs were common and in song about the Atka village (June 26), and on crossing the island (June 30) we found it to be the most abundant small bird on the island.

On the part of Tanaga Island covered on June 27, only three or four pairs of this bird were noted. The species was outnumbered by the Song Sparrows, Rosy Finches, and the Tanaga Wrens. I did not see it on Ogliuga, although Snow Buntings and Rosy Finches were present, and the low grassy island seemed as suitable for longspurs as others where it was common. On Amchitka (July 28) it again exceeded all other passerine birds in numbers and it was almost equally common on Carlisle and Kagamil Island (July 1). I did not note the species at all on St. George although it occurs there, while Snow Buntings were more numerous than on any other island visited and Rosy Finches were very common. On St. Paul, the Longspur was well distributed but in actual numbers it was less abundant than the Rosy Finch.

On St. Matthew (July 8) it was fairly common, but was greatly outnumbered on the tundras by McKay's Snow Bunting and Pribilof Sandpipers. On Nunivak Island (July 10 and 11), the numbers of this species and the Snow Bunting were about equal, while on Cape Vancouver, Nelson Island (July 12), it was again the most abundant passerine bird.

PRIBILOF SNOW BUNTING, *Plectrophenax nivalis townsendi* Ridgway.—This was one of the more common land birds of the Aleutians and Pribilofs. In many places it was the wildest and most wary of the land birds, whirling up and away at the slightest hint of danger. This was true of both individuals and flocks everywhere except on St. George Island where they were most abundant and also very tame, allowing us to walk to within a few feet as they fed in the grass or among the rocks. We first found the species on the Semidi Islands (June 18).

Notes on its relative abundance are given in the discussion of the Alaska Longspur and there is no need of repeating them here.

MCKAY'S SNOW BUNTING, *Plectrophenax hyperboreus* Ridgway.—As we approached the shore of St. Matthew Island (July 8), home of this beautiful and rare finch, there was much speculation as to when we would see the first one and how abundant the species would prove to be. Both questions were soon answered. There was some surf running, so we had to hunt for a place to land. Eventually we found a quiet spot between two rocky points at the edge of a large snow bank piled high just above the reach of the tides. As I jumped from the boat, I heard a sparrow's song above my head, and there on the edge of the drift sat my first McKay's Snow Bunting. As we climbed up the low bluff that faced the sea and got onto the flat tundra, fluttering white specks answered the question of abundance. There were many of them—sometimes scores—in sight at one time. These birds, like the Pribilof Snow Bunting, have a tendency to fly a considerable distance when disturbed. They were, however, less easily frightened. They are very active and alert with a nervous trick of giving the wings a quick flirt as they hop about, searching for food.

This species showed a distinct preference for the cliffs and beaches rather than the extensive tundra areas. Fully fledged young were on the wing although a few were still being fed by the parents.

The next day we landed well toward the northern end of the island and found the Snowflakes common but much more widely distributed over the rolling hills than they were in the rougher south end visited the previous day. The birds were also much more suspicious and hard to approach, behaving much like the Snow Buntings of the Pribilof Islands.

A CORRECTION.—In the previous installment of this paper (Auk, 61: 125, January, 1944), the Semipalmated Sandpiper (*Ereunetes pusillus*) was erroneously recorded from Nunivak Island. This record should be credited to the Western Sandpiper (*Ereunetes maurii* Cabanis).

Fish and Wildlife Service
Washington, D. C.

GENERAL NOTES

A new wren from the State of Washington.—

Thryomanes bewickii hurleyi, new subspecies

YAKIMA WREN

Type.—Adult ♂, No. 373010, U. S. National Museum (Biological Survey Collection); Parker, Yakima County, Washington; John B. Hurley, collector; March 28, 1943.

Subspecific characters.—Similar to *Thryomanes bewickii calophonus*, but larger and coloration distinctly more dusky—olive brown rather than the Prout's brown of *calophonus* or the cinamon brown of *ariboreus*; feet, tarsi, and bill heavier and more bulky than in any of the other northwestern races of *Thryomanes*, even the large *ariboreus*.

Measurements.—Adult male (type): wing, 52.5 mm.; tail, 52.5; exposed culmen, 15.5; tarsus, 20.5; middle toe without claw, 13. Average of four adult males from the type locality: wing, 53.8; tail, 52.3; exposed culmen, 15.6; tarsus, 21.1; middle toe without claw, 13.6.

Geographic distribution.—Known only from a very limited area within the riparian belt along the Yakima River on the Yakima Indian Reservation, near Parker, Yakima County, Washington, where it breeds and is probably resident in the dense willow, rose, and cottonwood thickets.

Discussion.—The most interesting fact about this well-marked new wren is its isolation from its relatives, its heavier and stronger bill, tarsi, and feet, and its extreme duskiess in coloration. The four specimens available, adult males from the type locality, all agree in size and color. In comparison with *calophonus* and *ariboreus*, found west of the Cascade Mountains, *hurleyi*, besides averaging larger, has no trace of the reddish tinge found in these two races. In comparison with the small, pale grayish *atrestus*, east of the Cascades in southern Oregon, the difference of *hurleyi* in greater size and dusky coloration is very pronounced.

Forty-six skins of *Thryomanes* from the U. S. National Museum, and sixty from the writer's private collection, a total of 106, were used in this study.

In slight recognition of the good work on the distribution and nesting habits of birds accomplished by John B. Hurley in eastern Washington, and especially in the Yakima Valley area, the name *Thryomanes bewickii hurleyi* is proposed for this new wren.—STANLEY G. JEWETT, Portland, Oregon.

A hitherto unnamed Glossy Starling from East Africa.—

Spreo hildebrandti kelloggorum, new subspecies

Type.—No. 95458, Chicago Natural History Museum; adult ♂, Benagi Hill, Zerengeti, Mwanza District, Tanganyika Territory, November 29, 1932; John Payne and Louise Kellogg, collectors.

Diagnosis.—Similar to *S. h. hildebrandti* (Cabanis), but at once distinguished from it by the breast being far lighter, almost white, strongly suffused with ochraceous yellow. The under side is thus composed of three different color zones—viz., the dark purple throat, the light ochraceous yellow breast, and the dark cinnamon belly and under tail-coverts. The secondaries are perhaps a trifle more bluish than in *S. h. hildebrandti*, tending slightly toward the blue-green of *S. shelleyi*. This race is somewhat larger than *S. h. hildebrandti*. Wing, ♂, 121–126 mm. as against 115–123 in ♂ of *S. h. hildebrandti*.

Distribution.—The highlands west of the Great Rift Valley in southern Kenya Colony and northern Tanganyika Territory—viz., Zerengeti Plain, Loita district, north at least to the Mara River and Sotik.

Remarks.—This subspecies is named in honor of Mr. and Mrs. Kellogg, who made a shooting expedition to the borderlands of Kenya Colony and Tanganyika Territory in November and December, 1932, from which they returned with a very interesting collection of 135 birdskins of seventy-one species, which they presented to the Chicago Natural History Museum.

My thanks are due to Mr. Rudyerd Boulton for allowing me to describe this fine race and to make use of his notes and measurements of almost all material of *S. hildebrandti* and *S. shelleyi* contained in the U. S. National Museum, American Museum of Natural History, Museum of Comparative Zoölogy, and The Academy of Natural Sciences of Philadelphia—altogether forty-six *hildebrandti* and eighteen *shelleyi*; also the correspondence which he had on this matter with James P. Chapin. I have, however, refrained from giving all measurements, as I do not have the material at my disposal and it seems to me that in some cases the collectors or their native assistants made mistakes in sexing.

In both races of *hildebrandti* and in *shelleyi*, the females seem to have a shorter wing than the males—an average difference of about 4 to 6 mm. Since van Someren most positively declares that he found *hildebrandti* and *shelleyi* breeding side by side in Ukamba and Teita (Nov. Zool., 29: 128, 1922; and *op. cit.*, 38: 314, 1931), I keep *shelleyi* as a distinct species, although with great hesitation and reserve.

It may be useful here to give the distribution of *S. h. hildebrandti*, as this has not been distinctly recorded to date by Reichenow ('Vögel Afrikas') or Sclater ('Systema Avium Aethiopicarum'), while van Someren (*loc. cit.*) records only the distribution in Kenya Colony, not in Tanganyika Territory.

S. h. hildebrandti is distributed from the regions south of Kikuyu—viz., Ukamba and Teita, where it meets *S. shelleyi*, to the Kilimanjaro and Usambara, to Kibaya, Burungi, Irangi, and to Usandawi in the west and northern Ugogo in the south, in which countries I observed and collected it in 1893 (*cf. Jour. für Orn.*, 48: 280, 1900). Emin collected it as far south as Mpapwa, Usagara. With the exception of the type and paratype of *S. h. kelloggorum*, I have never seen a specimen of any race of *hildebrandti* from the regions west of the Great Rift Valley. I know from Chapin's letter to Boulton that the specimens from Loita and the Mara River are *kelloggorum*. I assume, therefore, that the specimens from Simiu River (G. A. Fischer), that are not in the Berlin Museum, and from Kibrori and Serronea River (Bowen) also belong to this race.—OSCAR NEUMANN, *Chicago Natural History Museum*.

Oriolus percivali a valid race of *O. monacha*.—In 1903, Ogilvie-Grant¹ described an oriole from Kikuyu in East Africa which resembled *Oriolus larvatus* and *rolleti* but had wholly black median rectrices instead of greenish ones. He gave it the name of *O. percivali*. Seven years later, Reichenow² proposed the name *tanganjicae* for a very similar bird from the mountains northwest of Lake Tanganyika. Although he compared it to *O. nigripennis*, we now know *tanganjicae* to be a synonym of *percivali*.

From that time to the present, doubt has persisted as to the nature of *O. percivali*. It has been treated either as a distinct species or as a mere aberration of the

¹ Bull. Brit. Orn. Club, 14: 18, 1903.

² Orn. Monatsber., 18: 161, 1910.

monacha-larvatus group. Now Grant and Mackworth-Praed¹ deny any validity to the name *percivali*, since they regard it as based on a color phase of *O. monacha rolleti*.

The situation which led to this erroneous decision is well known, and the more important references bearing upon it are given by Grant and Mackworth-Praed. In the Kikuyu highland, between Nairobi and the base of Mt. Kenya, one finds but few of the 'black-tailed' birds, and many more of the 'green-tailed' sort. There are also a few intermediates, with median rectrices green at the base, shading to black toward their tips.

It may be recalled that in the lowland forests of western Africa the 'black-tailed' *Oriolus nigripennis* and the 'green-tailed' *C. brachyrhynchus* live side by side as perfectly distinct species. It must be understood that the outer rectrices of both types of orioles are broadly tipped with yellow. In eastern Africa, *rolleti* and *percivali* are clearly not separate species, for they intergrade with each other. Neither are they races of the West African birds, for they intergrade only with the *monacha-larvata* group which ranges from South Africa and Angola to Eritrea.

I shall not attempt to decide here whether *rolleti* and *larvatus* are really races of *O. monacha*, and while calling attention to the well-founded objections of Professor Neumann² I shall continue to treat *monacha* as a species including those races. Neither shall I attempt to uphold *kikuyuensis* as a race distinct from *rolleti*. My sole aim is to prove the validity of *O. m. percivali*.

In the forest of Mt. Kenya itself, up to 8,500 feet, Colonel Meinertzhagen found only the black-tailed *percivali*, and on Mt. Elgon Dr. Granvik had the same experience. The 'color phase' therefore has definite areas where it certainly predominates, and that alone should justify its recognition as a geographic race. Dr. van Someren's statement that he found only *percivali* in the Kakamega Forest surprises me, for the elevation there is only around 5,000 feet, and *Oriolus brachyrhynchus laetior* seems to be a common bird at Kakamega. Yet one undoubted specimen of *percivali* was collected for Colonel Meinertzhagen at Lerundo in the Kavirondo District, and Sir Frederick Jackson recorded *percivali* from Nandi. On the western edge of the Uganda depression, both the British Museum Ruwenzori Expedition and Rudolf Grauer collected the black-tailed race in the Mpanga Forest at about 5,000 feet. Their green-tailed specimens of *rolleti* came from Mokia, at 3,500 feet, and the vicinity of Kasindi, at a similar elevation.

If the British Museum has but three specimens of *percivali* with median rectrices wholly black, it only goes to show that the birds of the higher forests of Mt. Kenya and Mt. Elgon are poorly represented there. The fact that *Oriolus tanganjicae* was described from a montane area far removed from Kenya Colony ought to have led investigation toward the eastern Congo highlands. Rudolf Grauer, who secured the type of *tanganjicae*, worked systematically in the Kivu District and in the mountains just northwest of Lake Tanganyika. There, in 1907-1908 and in 1910, he collected³ about twenty-four specimens of *O. m. percivali* for Lord Rothschild and twenty-nine for the Vienna Museum. Above an elevation of 5,000 feet he never obtained any green-tailed birds or intermediates, although he did find *O. m. rolleti* at 3,900 feet just west of Baraka, below the level of mountain forest, and also well to the eastward in Urundi, toward the open Kagera Valley. The record of *rolleti* by Loveridge³ from Idjwi Island in Lake Kivu was based on black-tailed birds.

¹ Bull. Brit. Orn. Club, 63: 52; 64: 24, 25, 1943.

² Journ. f. Orn., 53: 235, 1905.

³ Peters and Loveridge, Bull. Mus. Comp. Zool., 89: 245, 1942.

In 1933-1935 G. F. de Witte¹ collected twenty-one specimens of *percivali* among and near the Kivu Volcanoes, at localities between 6,200 and 7,000 feet. At Mbwahi, on the mountains southwest of Lake Kivu, Guy Babault secured only *percivali*, as reported by Berlioz.² Still more recently, R. E. Moreau³ states that *percivali* was the only oriole obtained in the Kungwe-Mahare mountain forests, on the eastern side of Lake Tanganyika. It should therefore be clear that not only on Kenya and Elgon, but on the Kivu Volcanoes and on forested highlands on both sides of the Albertine Rift, *Oriolus monacha percivali* is found to the exclusion of any green-tailed form.

My own experience with this oriole in the highlands of the eastern Congo goes back to 1926-1927. Although *percivali* had been obtained in the Mpanga Forest, I never saw it or any other form of the species up on Ruwenzori. I did collect *rolleti* at the Lubilia River, not far from Kasindi. It was not until I had crossed the Semliki Valley and reached Mt. Nyemilima, northwest of Lake Edward, that I found the black-tailed *percivali* again in heavy forest at 8,100 feet. That was on the western scarp of the Albertine Rift, where we may be sure that it ranges southward for a distance of at least 260 miles to the vicinity of Uvira.

Within the Albertine Rift rise the Kivu Volcanoes, with plenty of mountain forest above 6,000 feet. There I found *percivali* common on Mt. Mikenno and Mt. Niragongo, from 6,000 to 8,000 feet, with never a sign of a green-tailed bird.

On the eastern scarp of the Albertine Rift, Grauer and I both collected *percivali* in forests just east of the Rutshuru Plain, at about 5,300 feet. Jackson and Slater report it from Kigezi, and although there is no record from the Rugege Forest, southeast of Lake Kivu, the black-tailed race certainly extends southward to Kungwe-Mahare. But the Ufipa highland may have only *rolleti*, and we know that to be the only form in Marungu, across the lake.

It has sometimes been suggested that *percivali* might be a highland race of *O. nigripennis*. But there is no suggestion of any such intergradation between these two forms as we know to exist between *percivali* and *O. monacha rolleti*. Many authors have regarded *brachyrhynchus* and *laetior* as races of *O. monacha*. With this I disagree because the juvenal plumages are very different; and I find scant evidence of any intergradation in western Uganda, where *laetior* is a common bird in the heavy forests, and *rolleti* rather uncommon in the savannas.

As for *percivali*, the correct conclusion is perfectly clear. It is a valid race of *Oriolus monacha*, or of *O. larvatus* if Professor Neumann's opinion is correct, and lives in forested highlands above 5,000 feet from Mt. Kenya and Mt. Elgon westward to the Kivu Volcanoes, the highlands west of Lake Edward and Lake Kivu, southward to the vicinity of Uvira and to the Kungwe-Mahare highland east of Lake Tanganyika.—JAMES P. CHAPIN, *American Museum of Natural History, New York, N. Y.*

Description of a new hybrid warbler.—On August 30, 1938, I was on Cat Island, Mississippi, nine miles offshore from Gulfport, engaged at the time in a study of the fall migration along the Mississippi gulf coast. Certain specimens of taxonomic interest were taken that day, among them a warbler that I found I was unable to identify. Superficially it resembled a female Redstart, but on closer examination differences were noted that showed clearly that this bird could not be referred to

¹ Schouteden, Expl. Parc. Nat. Albert, Inst. Parcs Nat. Congo Belge, Brussels, fasc. 9: 136, 1938.

² Bull. Mus. Paris (2) 8: 492, 1936.

³ Ibis, 85: 394, 1943.

the genus *Setophaga*. When opportunity offered, this specimen was compared with material in the U. S. National Museum, and the conclusion was finally reached that it was beyond any question a hybrid between the Redstart (*Setophaga ruticilla*) and the Parula Warbler (*Compsothlypis americana*). Hybrids between these two widely separated genera might, at first glance, seem highly improbable, but it should be remembered that other apparent examples of this nature have been reported in past years. Furthermore these two species are known to nest throughout much of their range in the same wooded swamp, or stretch of bottom land, where there is continual contact between the individuals occupying any given area. It is reasonable to suppose, then, that under certain conditions, interbreeding might occur, even though evidence of such hybridization has not been recorded heretofore.

As stated above, this specimen bears a superficial resemblance to the female Redstart but close scrutiny reveals marked differences. The bill is not broadly wedge-shaped as in the Redstart, and the rictal bristles are developed only to the same degree as in the Parula Warbler, in this respect differing markedly from the genus *Setophaga*. The wings have the middle and greater wing-coverts broadly tipped with dull white, forming two distinct bands, and there is a complete absence of the speculum on the inner remiges. The tail, although noticeably longer than in the genus *Compsothlypis*, lacks the yellow characteristic of *Setophaga*; this basal portion of the outer rectrices is dull white instead. The color pattern of the upper parts is distinctly that of the Parula Warbler, and while duller in hue, the olive green of the mantle is in contrast to the color of the lower back. On the other hand, the under parts suggest the Redstart, the throat being dull white rather than yellow, with the median portion of the breast tinged with light salmon. Actually this specimen has an odd mixture of the characters ascribed to these two genera, and this is probably best shown by the tail pattern. The tail is shaped like that of the Redstart, although the individual feathers are acute and relatively broad. The pale areas reach nearer the tips of the feathers than in the Redstart, but not as near the tips as the terminal edges of the white spots on the tail of the Parula Warbler. In appearance they seem as long as in the Redstart but since the dark tips are shorter the proportion is different. A close examination shows, too, that they do not reach quite so distinctly to the bases of the rectrices as in the Redstart.

Description.—Pileum and hindneck plain mouse gray; back, scapulars and rump dull olive green; upper tail-coverts dusky; wings dusky, with dark olive edgings; middle and greater wing-coverts dusky, washed with dull olive green and broadly tipped with dull white, forming two distinct bands; basal portion of two outer rectrices, for two thirds of their length, dull white, with the inner edge tinged with yellow; the inner third rectrix with a small white spot near the center; terminal portion and other rectrices dusky; sides of head paler gray than pileum; malar region, chin, and throat dull white; chest washed with a broad band of yellow and light salmon; rest of under parts largely dull white but the sides and flanks gray with a tinge of yellow; wing, 57.1 mm.; tail, 46.2; culmen, 9; tarsus, 15.8.

In connection with the measurements, it is interesting to note that this unusual warbler is smaller than the Redstart but larger than the Parula Warbler. Ridgway ('Birds of North and Middle America,' U. S. Nat. Mus. Bull. 50, part 2: 481 and 724, 1902) gives the average measurements for these two species as follows:

Redstart	wing, 61.1	tail, 54.1	culmen, 8.8	tarsus, 17.1
Parula Warbler	wing, 54.7	tail, 39.6	culmen, 10.1	tarsus, 16.1

I wish to acknowledge to Dr. Alexander Wetmore and to Dr. John T. Zimmer my appreciation for their critical examination of this specimen, and for their able diagnosis of the characters demonstrated, and to George H. Lowery, Jr., for his criticism and comments in connection with the preparation of this paper.—THOS. D. BURLEIGH, Fish and Wildlife Service, Baton Rouge, Louisiana.

The wing-formula in *Empidonax traillii*.—Current literature places the Alder Flycatcher and its geographic representatives among those species of *Empidonax* that have the outer (tenth) primary longer than the fifth. This is only partially correct. It is true that, in *E. t. traillii*, the outer primary is normally a little longer than, or equal to, the fifth; but in *E. t. brewsteri* it is almost invariably shorter than the fifth. The difference, though slight, is so constant that I find it very important in the determination of specimens, together with the less olivaceous coloring of *brewsteri*. Size of bill does not seem important to me. It is interesting to note here the close parallel to the differences between *E. flaviventris* and the northern races of *E. difficilis*.

The taxonomy used herein is that of the 1931 A. O. U. Check-List. I do not wish to enter into a discussion of geographic variation or distribution at this time, when my notes are not available to me. It may be well to emphasize, however, that immatures are browner than spring adults and must not be compared with them. Some of the confusion which has occurred (especially in Oklahoma) is due to such comparison.—ALLAN R. PHILLIPS, Museum of Northern Arizona, Flagstaff, Arizona.

Some differences between the Wright's and Gray Flycatchers.—During the long history of confusion of Wright's Flycatcher (*Empidonax "oberholseri"*)¹ and the Gray Flycatcher (*Empidonax "wrighti"*)², the impression has arisen that the two species are extremely difficult to distinguish in the hand, and impossible in the field. The former species is likewise thought to be closely similar to Hammond's Flycatcher (*Empidonax hammondi*). The writer's studies of the genus *Empidonax* in Arizona, both afield and in the museums, have brought out some previously neglected criteria to help distinguish these species.

In the field, I have repeatedly observed that the Gray Flycatcher wags its tail in the manner of a *Phoebe*, though less vigorously. This is in contrast to the tail-jerking motion that generally characterizes the genus *Empidonax*. On the few occasions on which I have shot a tail-wagging *Empidonax* from a distance, it has proved to be a Gray Flycatcher. I believe that this is a constant character; I have never seen a Gray Flycatcher jerk its tail, nor have I seen any other *Empidonax* wag its tail. Collectors should give this matter the very closest attention. If I am correct, the Gray Flycatcher, far from being among our most difficult species, is the easiest *Empidonax* to identify afield. There are other points that I find helpful, too. A fresh-plumaged Gray Flycatcher, especially a fall immature, is such a clear, clean, pale gray and white (devoid of olive tones), with rather conspicuously white-edged tail, as to be fairly distinctive, and the yellow base (in life) of the lower mandible is a reliable character at close range. Then, too, the Gray Flycatcher at all seasons frequents more open country than is favored by other *Empidonaces*, being found characteristically in open brush instead of dense bushes or trees. I do not mean to imply that any member of this genus is easy to identify

¹ *Empidonax wrighti* of the A. O. U. Check-list, fourth edition, 1951.—Ed.

² *Empidonax griseus* of the Check-List.—Ed.

afield. They are all difficult; but an observer who is thoroughly familiar with the various plumages in properly identified museum skins can distinguish many birds in the field. On the other hand, some species (*hammondi* and "*oberholseri*", for example) I am quite unable to distinguish afield, unless they sing; nor do they sing on migration, in my experience.

In the hand, one of the most important characters of Wright's Flycatcher is its very rounded wing. The outer (tenth) primary is normally *shorter than the fourth*—a fact that I do not find recorded in our literature. In the Gray, it is usually longer than the fourth but shorter than the fifth; in Hammond's, it is about equal to the fifth, or a little longer. In the last species, therefore, a measurement of the difference (fifth primary minus tenth) will seldom exceed one or two millimeters; in "*oberholseri*" it will be much greater, and I do not think any overlapping will be found (excluding, of course, specimens in molt). Unfortunately, I do not now have access to my notes, so cannot give exact measurements. Lengths of bill and tarsus are, of course, also of great value in determining specimens of *hammondi*.

Through the courtesy of the authorities of the U. S. National Museum, I was enabled to reexamine the type specimen of *Empidonax wrightii* Baird in the summer of 1941, after I had affirmed this new wing-formula character. In this specimen, the wing-tail difference is so nearly intermediate that I would prefer to withhold judgment on that basis; but Moore (Auk, 57: 357, 1940) states that the specimen is, on that basis, a Gray Flycatcher. At any rate, the type is a perfectly typical Gray Flycatcher in every other respect (wing formula, bill shape and color, outer web of outer rectrix, etc.).

Regardless of whether field studies should show the desirability of calling the Gray Flycatcher a northern race of *E. affinis*, I certainly do not consider Wright's Flycatcher conspecific with that or any other series.

Current literature assigns Wright's Flycatcher a more southerly winter range than the Gray, but the difference, if any, is very slight. It has been shown that Wright's Flycatcher winters north to southern Arizona (Monson and Phillips, Condor, 43: 109, 1941); and I have previously noted (Auk, 59: 427, 1942) that Guatemalan records are in error—the birds are mostly atypical specimens of *hammondi*.

The breeding range of Wright's Flycatcher, being more boreal zonally (as well as differing associationally) than that of the Gray, is thereby enabled to extend farther north and west. To the south and east, the limits of their breeding ranges nearly coincide. On migration in Arizona, the Gray Flycatcher seems to be an earlier migrant in spring than Wright's; fall data are not yet very satisfactory.—ALLAN R. PHILLIPS, Museum of Northern Arizona, Flagstaff, Arizona.

Anser gambelli.—In the Revue et Magazin de Zoologie (Ser. 2) 4 (1): 7, January, 1852, Dr. G. Hartlaub gave comparative measurements for three specimens of White-fronted Geese from Texas and the southern part of North America and based upon them the new specific name, *Anser Gambelli*. The specific name is capitalized, as is the only other one in the paper (*Kaupii*) apparently dedicated to an individual, but nothing is said as to its significance. American ornithologists have assumed that the form was named for William Gambel, and Coues asserts this to be the case in his Check-List (Second Edition, 1882, p. 111). There he spells the term with one 'l' in the text and with two in a footnote indicating its pronunciation. In the A. O. U. Check-Lists we find the spelling *gambeli* in both the

main entry and in the references in Edition 1 (1886, p. 126) and Edition 2 (1895, p. 61). In the Third Edition (1910, p. 85), one 'I' is used in the standard name and two in the citation of the original description, while in the Fourth Edition (1931, p. 40), 'Il' appears in both places.

From the study the writer has made of the matter, it appears that there is no published evidence that the bird was named for William Gambel. Possibly Coues had correspondence to support his remark. In any event, if the goose name was derived from that of Gambel, it should be spelled with one 'I' and the original spelling regarded as a typographical error. On the other hand, if the spelling *gambelli* is retained as an arbitrary combination of letters, no claim should be made that the form was dedicated to the American ornithologist, William Gambel. Under present limitations of knowledge of the term, the latter of the two alternatives is correct according to strict taxonomic procedure, though the former seems more natural and preferable.

For the form called *Anser albifrons gambelli*, the A. O. U. Check-List (Edition 4, 1931, p. 40) notes: "breeding range unknown . . . Winters in the Sacramento Valley, California." This treatment follows that of Swarth and Bryant [Univ. Calif. Publ. in Zool., 17 (1): 209-222, October, 1917], but is it not obvious, if the Tule Goose, as defined by them, is restricted in winter to the Sacramento, that it should not bear the name *gambelli*, originally applied to geese from Texas and the southern part of North America? Swarth and Bryant cite Hartlaub's name correctly but chiefly employ the spelling '*gambeli*.' Under a one-letter rule this name could be regarded as distinct from *gambelli*, but, being often preoccupied, would not be available for the Tule Goose, whatever its status. There is an ascriptive, zoological, and nomenclatorial tangle here that can only be straightened out by much further historical and taxonomic research.—W. L. McATEE.

Song Sparrow turning white within a month.—On September 26, 1941, I banded in normal plumage an Eastern Song Sparrow (*Melospiza m. melodia*) 41-45328 at North Andover, Massachusetts. The sparrow was recaptured for the first and only time on October 24, 1941.

During this short interval of twenty-eight days its plumage had become noticeably albinistic. The head, nape, and upper tail-coverts were almost entirely white, and the back, scapulars, and rump about half white. The fourth and fifth tail feathers from the left had lost all pigmentation, while the remaining rectrices were normal. The flight feathers were unchanged except for one mostly white tertial on the right wing. The primary and greater upper coverts on this wing were mainly white, while the median and lesser coverts were about one-half white. On the left wing the primary and greater coverts were all tipped with white, as were a few of the median and lesser coverts. The streakings of the breast persisted but were subdued by many white feathers in the breast. The rest of the under parts appeared normal except for the under tail-coverts which were largely white. Eyes, bill, legs, and feet contained normal pigmentation, indicating that this bird was not a true albino.

Forbush ('Birds of Massachusetts and Other New England States,' 3: 93, 1929) indicates that the molting season of the Song Sparrow is at the exact period covering the two dates of capture. Hence some molt undoubtedly took place at this time, characterized by absence of pigment in many areas of the new plumage, resulting in an incomplete and asymmetrical albinism.—OSCAR M. ROOT, *Brooks School, North Andover, Massachusetts.*

The Purple Grackle as a scavenger.—The Purple Grackle (*Quiscalus quiscula*) has been under my observation for the entire summer. This bird is abundant in the National Zoological Park, and it is easy for one to observe and admire it on walks through the park. At this date of writing, August 22, 1943, the birds are gathering in combined family groups and engaging in pre-migration flights. The search for food is always first in their minds and they frequent many strange places to satisfy their greedy longings. Throughout the park are trash containers into which visitors deposit numerous objects, among which are lunch boxes containing bits of food. I have observed groups of *Quiscalus* perching in trees awaiting the deposit of scraps into these baskets, whereupon the group will dive into the container and pick out the food, fly away to a safe place to eat, and return to the container for more.

The many squirrels in the park accept peanuts from the hands of visitors. The grackle does not go this far in fraternization with humans, but diners on the open porch of the restaurant in the park are often amazed to see the bird walking around under the tables and flying away with bits of dropped food. This summer, while I was at Rehoboth Beach, Delaware, large flocks of birds took possession of the beach in their search for food particles discarded during the day by bathers. They appeared to be fond of the popcorn that is sold to the vacationists on the boardwalk, and in the evenings searched the beach and boardwalk for any food that may have fallen to the ground.—MALCOLM DAVIS, *National Zoological Park, Washington, D. C.*

The grackle as a fisher.—The observation recorded by Cottam (Auk, 60: 594-595, 1943) reminds me of a rather similar instance of fishing by the Bronzed Grackle (*Quiscalus quiscula aeneus*). On August 15, 1943, I was watching several grackles flying about on the shore of Lake Michigan in southeastern Evanston, Illinois. One of the birds swooped across the calm surface of the water about five feet from shore, brushing its feet and breast feathers as it did so, and with its beak picked up a small, light-colored object. The bird momentarily alighted on the sand, then fluttered to the top of some near-by piling. In the bright light, at a distance of about twenty-five feet, I could see that the object in its beak was a motionless fish about one and one-half inches long. After a pause, the grackle, disturbed by the approach of a person, flew away with its prize. Several small fish, apparently young perch, were seen floating dead on the water in the place where the bird had swooped.—VICTOR H. CAHALANE, *National Park Service, Chicago, Illinois.*

Remarkable aerial behavior of the Purple Martin.—What seems to the writer to be a remarkable exhibition of aerial activity on the part of a Purple Martin (*Progne subis subis*) was witnessed late in the afternoon of June 18, 1943, over the Inland Waterway near his home. This is across the Ashley River from Charleston, South Carolina, and lies on what is known as Wappoo Cut that connects the Ashley and Stono rivers.

About 7:15 p. m. on the above date, a male martin was seen going through extraordinary aerial gymnastics apparently to no purpose. However, closer observation revealed that the bird had a large, crinkly straw or wisp of grass with which it was very evidently playing. Flying normally at an elevation of about 100 feet, it would drop the straw and then diving, side-slipping and rolling, would plunge beneath it and seize it in its beak again as it 'zoomed' upward to meet it.

In seizing the straw on several occasions it descended to within only a few feet

of the tops of the salt marsh or the surface of the Cut, only to climb aloft once more and repeat the performance. In its swoops to regain the straw, the martin went through practically every aerial maneuver known to 'stunt' pilots! It performed nose dives, falling leaves (waving downward in pendulum-like drops from side to side) and at one time did something which was difficult to credit even while watching it. At the top of an upward climb it slanted its body sharply and went into what airmen know as a stall. For a second it hung motionless, then glided *backward, tail first* for an appreciable distance! As if this were not quite enough, it also accomplished a feat which the writer has never seen any other bird perform except the Wood Ibis (*Mycteria americana*). It turned over easily and completely and sailed along in inverted flight for several yards! As on the two occasions when the Ibis has been seen to do this, there was no movement of the wings whatever. They were held rigidly outstretched, and the bird soared, or glided, upside down. This was done four times in the twelve or fifteen minutes we watched (there were three observers).

The termination of this thrilling performance transpired when the martin finally missed the straw which fell into the water, whereupon the bird flew off in a southerly direction toward James Island. Though I have known the martin intimately for a lifetime, two phases of its behavior came to light in that brief period for the first time in my experience. It indulges in a spirit of play and it is capable of inverted, soaring flight.—ALEXANDER SPRUNT, JR., *The Crescent, Charleston, South Carolina.*

A bird's remarkable concentration of attention.—At seven o'clock in the morning of November 14, 1941, when it was barely clear daylight, three automobiles, approximately fifty yards apart, were traveling at a speed of thirty-five miles per hour in the same direction along a concrete highway in Johnson County, Kansas. The writer was driving the rear car. Suddenly a Downy Woodpecker (*Dryobates pubescens*) was observed to fly across the road well in front of the first car. After alighting momentarily in a tree beside the road, the bird suddenly flew almost directly toward the first oncoming car, alighted beside the highway, not more than four feet from its edge, and began vigorously to peck at something on the ground. While both the first and the second cars passed within a few feet, the bird remained seemingly entirely unconscious of disturbing influences. This seemed quite unusual because the middle car was old and very noisy. Even when the writer slowed down in passing, for better observation and for careful identification, the bird seemed to be utterly oblivious. Unconcernedly he continued at his early breakfast on the ground until the last car was some distance down the road, when he flew leisurely toward the trees.

Later check with the collection in the Dyche Museum at the State University confirmed the identification. It has been regretted that we did not ascertain the nature of the food.—B. ASHTON KEITH, *Institute of Sciences, Kansas City, Kansas.*

A Robin anting.—For the past months I have read in the literature of ornithology numerous articles on the 'anting' of birds. The description of this peculiar phenomenon did not impress me, for I was inclined to regard the observations as fantastic. Then the articles in 'The Auk' for January, 1943, by H. R. Ivor, Horace Groskin, Charles K. Nichols, and Josselyn Van Tyne aroused my interest in the subject and I determined to witness a bird in the act.

The National Zoological Park has many birds in captivity. I collected many forms of ants that are common in Washington, D. C., and put the insects in the birds' cages. But nothing happened; the birds ignored the ants. While making

my rounds of duty one Sunday afternoon in the park, I observed a Robin (*Turdus migratorius*) preening itself much more vigorously than is the custom of this species. It then fell over on its side, got up, and preened again. I noticed that, before preening the wing feathers, it picked a small ant from the ground. So fascinated was the bird in the act that park visitors walked within three feet of it while it continued its anting. The ants were *Lasius claviger*.—MALCOLM DAVIS, *National Zoological Park, Washington, D. C.*

Red-eyed Towhee anting.—My paper on "Anting by Birds" (Auk, 55: 98-105, 1938), like various other summaries, was followed by a surprising number of new articles and observations. As noted in that paper, the writer up to that time had not personally seen a bird anting. However, he has recently had that good fortune. The species concerned was the Red-eyed Towhee for which Van Tyne (Auk, 60: 61, 1943) reports that he had found no earlier record. At McLean, Virginia, while I was sitting on a porch during the evening (August 4, 1943), my attention was drawn to a bird under a bush. As I was engaged in conversation, it took some time for the impression of what I was seeing to crystallize. Then, with a burst of surprise and pleasure, the realization came that at last, after fifty years of bird observation, I was actually seeing anting. The bird, a male, kept very busy, picking objects from the ground and making passes with the beak both over and under the wings. The latter were held raised and arched and the feathers in general were fluffed so that the Towhee presented a peculiar, disjointed, and un-birdlike appearance. The performance lasted several minutes. Upon examination of the spot, ants were found running in all directions. They were *Lasius niger* var. *americanus*.—W. L. MCATEE, *Wildlife Service, Chicago, Illinois.*

Unusual incubation of the Red-eyed Vireo.—On June 9, 1943, a typical nest of the Red-eyed Vireo (*Vireo olivaceus*) was found six feet from the ground at the end of a branch of a white oak tree in Falls Church, Fairfax County, Virginia. Inasmuch as no unusual circumstances were suspected, daily observations of the nest were not made at first, but from the record quoted below it will be seen that the behavior of the parent vireo varied markedly from normal in that incubation was begun upon the laying of the first egg, not upon completion of the clutch. All observations were made by the author at 8 p. m. on the dates shown, except the last two which were reported by an interested neighbor in the author's absence.

June 9	Nest discovered completed, empty
June 10	First egg presumably laid
June 11	Two eggs present; adult on nest
June 12	Third egg presumably laid
June 13	Three eggs; adult apparently incubating
June 23	Two eggs; newly hatched young present
June 24	One egg; two young present
June 25	Three young present, each a different size
July 4	One young reported to have quit nest
July 5	Other two young reported to have quit nest

Assuming that the eggs were laid regularly on June 10, 11, and 12, the incubation period was thirteen days each, and the young remained in the nest eleven to twelve days.—ENSIGN GEORGE A. PETRIDES, U.S.N.R., U.S.N. Preflight School, Chapel Hill, North Carolina.

Coot attacks young duck.—While at the North American waterfowl pond in the National Zoological Park, Washington, D. C., I observed a downy young Mallard, that had strayed away from its group, crossing the pond. Suddenly a Coot, one of a pair that was nesting, left its nest and started for the young duck. The duck dived under the water and the coot dived after it, coming up with the young duck in its bill. When I jumped over the fence, the Coot freed the little duck and went back to its nest. The Mallard then proceeded across the pond, rejoining its family.—J. A. COLLINS, *Captain, National Zoological Park Police, Washington, D. C.*

An unusual nest of the Yellow Warbler.—A nest of the Eastern Yellow Warbler, *Dendroica aestiva aestiva* (Gmelin), composed of five distinct units or 'stories' was collected near Brimfield, Ohio, on December 26, 1942. It was placed six feet above the ground in the top of a high-blueberry bush growing in a swamp. The nest had a total height of nine inches. It was probably constructed during the spring of 1942 judging by the excellent condition of preservation and the young stems in which it was built. The first three 'stories' contained no lining, but were distinct cups set within each other and easily separated. They formed a cone wedged into the branches of the blueberry bush. Presumably these layers were built to form a platform at a level high above the crotch where the branches would not be so closely crowded together and thus would permit easy access to the nest. The fourth unit was completely lined. Within this was a second floor of nesting material, chiefly stems of grasses, which held two eggs of the Eastern Cowbird, *Molothrus ater ater* (Boddaert). On the top of this was constructed the fifth and last unit which also was lined and normal in every respect. The usual Yellow Warbler's nest measures about three inches in height. The one reported here was three times as high because of the additional bottom layers and the necessity of building a new nest over the eggs of the socially parasitic cowbird.—RALPH W. DEXTER, *Kent State University, Kent, Ohio.*

The Southern Pileated Woodpecker an unusual victim of the automobile.—While driving from Chicago to Florida in October, 1942, we noticed, besides numerous dead opossums and skunks killed on the highway by passing cars, also a Pileated Woodpecker. While the Red-headed Woodpecker is an altogether too common victim, this was the only instance of a Pileated fatality that I have seen or heard of. Since the locality was in northern Alabama, it was presumably the Southern Pileated Woodpecker (*Ceophloeus pileatus pileatus*).—C. W. G. EIFRIG, *Windermere, Florida.*

Roosting tree for the Turkey Vulture.—On the same journey mentioned above, we passed, near Brownstown, Indiana, a large dead sycamore, which was used as a roost by Turkey Vultures, and had been used thus for a long time, as we found out upon inquiry. There were thirteen of the bulky birds perching on the tree as we passed, but our informant told us that he had seen as many as thirty at one time. Strangely, we had not seen a Turkey Vulture all the way from Chicago to Brownstown.—C. W. G. EIFRIG, *Windermere, Florida.*

Sparrow Hawk incubating Wood Duck eggs.—On May 27, 1943, the writers frightened a female Sparrow Hawk (*Falco sparverius sparverius*) from a Wood Duck nesting box in a black-oak wood lot one-fourth mile east of Bath, Illinois. We were very much surprised on removing the box lid to find that the Sparrow Hawk had not been incubating its own eggs, but those of a Wood Duck (*Aix sponsa*).

The six Wood Duck eggs were much warmer than air temperature, and because this was an incomplete clutch, it was obvious that they had not been incubated by a Wood Duck.

It was not possible for us to inspect this box again until June 16. Then we found that one of the Wood Duck eggs had evidently hatched and one egg was infertile, while there were no traces of the remaining eggs. We believed that one egg had hatched or nearly hatched for we found the skull and vertebrae of one duckling.

We believe that the Sparrow Hawk that displayed this strong brooding instinct was an individual whose eggs had been destroyed in a nesting box about one mile from the above place. We knew of no other nesting Sparrow Hawk female in the entire region.—FRANK C. BELLROSE, JR., AND JESSOP B. LOW, *Illinois Natural History Survey, Urbana, Illinois*.

***Riccordia ricordii* seen at Miami, Florida.**—At Matheson Hammock County Park on October 20, 1943, I had the rare privilege of finding a hummingbird which does not appear on the A.O.U. Check-List for North America. The bird was seen on other occasions by myself and others as listed below. Through the kindness of Dr. Frank M. Chapman, to whom I had the pleasure of showing this bird, careful descriptions from field observations were sent to Dr. John T. Zimmer, Curator of Birds at the American Museum of Natural History in New York City. Dr. Zimmer decided that the Cuban Emerald Hummer, *Riccordia ricordii ricordii*, or an allied race, most nearly fitted our descriptions, and very kindly sent Dr. Chapman a skin of that species. The skin was examined by all who had seen the living bird, and all agreed that it was the same species. A. H. Evans, 'Birds' (1909), refers to the genus *Sporadinus* (= *Riccordia*) as inhabiting Florida, the Bahamas, and the Greater Antilles. Cory, 'Birds of the Bahamas,' describes *Sporadinus ricordi* (= *Riccordia r. bracei*). From the estimated depth of fork in the tail of the bird as observed, this writer would place the bird in the Cuban subspecies. However, it appears impossible definitely to identify the subspecies of *Riccordia* in the field. Such identification must wait upon the collection of a specimen. In the meantime a definite sight record of the species *Riccordia ricordii* has been made in the United States. The writer wishes to extend his sincere thanks to Dr. Chapman and Dr. Zimmer for their help in making the identification.

FIELD OBSERVATIONS

October 20, 1943	Stimson	perched and in flight in the sun
October 21, 1943	Stimson	five observations in sunlight
October 23, 1943	A. J. Dietrich, R. Woodmansee, and Stimson	perched and in flight in sun and shade
October 24, 1943	Woodmansee	
October 25, 1943	Dr. Frank M. Chapman and Stimson	perched on cloudy day
October 27, 1943	Dietrich	
October 30, 1943	Dietrich, Woodmansee, and Stimson	
November 13, 1943	Dietrich, Woodmansee, and Stimson	perched in shade.

LOUIS ALBERT STIMSON, *Miami, Florida*

Wilson's Phalarope in Virginia.—On September 17, 1942, a Wilson's Phalarope (*Steganopus tricolor*) was observed on the sand flats of the Fish and Wildlife Service

Refuge, Back Bay, Virginia, by Mrs. C. A. Barefield, Mrs. Colgate Darden, Jr., H. A. Bailey, Manager of the Refuge, and myself. It was feeding at the edge of the water in the cove opposite Cedar Island. The flats at this place were covered with water to the depth of one or two inches. The phalarope attracted our attention by its exquisitely dainty head and neck and its dazzlingly white breast and under parts. The legs appeared conspicuously yellow, the bill fine and apparently at least as long as the width of the head. As the phalarope fed we saw it whirl completely around in a circle, very fast; also it dabbled from side to side. At no time did we see it swimming in the water. Because of the noticeably clear yellow of the legs we did not think it could be confused with anything except the Lesser Yellow-legs, and we had an excellent opportunity to compare it with a group of ten Lesser Yellow-legs and one Greater Yellow-legs, which were feeding not many yards away. We also flushed it to make certain that there was not a noticeable wing-stripe. Later the phalarope joined a group of twelve Pectoral Sandpipers, four White-rumped Sandpipers, and Semipalmated Sandpipers. Mrs. Darden took moving pictures of it, and Dr. J. J. Murray showed a portion of her film to Mr. Ludlow Griscom who confirmed our identification of it as a Wilson's Phalarope. Dr. Murray states that this is an addition to the Virginia bird list, that it is a rare visitor at Cape May, New Jersey, and that there are only a half-dozen North Carolina records.—Mrs. A. C. REED, Norfolk, Virginia.

Flamingo on the Texas coast.—There have been many reports of Flamingoes (*Phoenicopterus ruber* Linnaeus) on the coast of Texas, but since these birds might be confused by the layman with the Roseate Spoonbill and since spoonbills are commonly observed on the Texas coast, it has been concluded by ornithologists that there was little proof that a Flamingo had ever been seen in Texas in the natural state. If there are any published records, they are unknown to the writer.

On July 27, 1943, Mr. Fred C. Stark of the San Antonio Zoological Park, Mr. F. F. Dietz of San Antonio, and the writer left Rockport, Texas, on a Game, Fish and Oyster Commission launch. I am indebted to Captain M. B. Mullinax and Mr. Ben A. Earp, who piloted the boat, and other officials of the Game, Fish and Oyster Commission for the privilege of making this trip. The purpose of the trip was to collect young birds for the San Antonio Zoological Park.

While we were cruising along near Carroll Island of the Second Chain of Islands in lower San Antonio Bay, I saw a Flamingo standing in the water near the island. The observation was made through binoculars (Zeiss 8 x 40). I immediately asked Captain Mullinax to stop the boat. Mr. Stark verified the identification and Mr. Earp, who has been a taxidermist for many years and who is acquainted with bird life, also concurred in the identification, as did Mr. Dietz, who is a student of birds. Captain Mullinax was the last to view the bird with the glasses. The men then left the boat and I waded toward the bird, which had not moved from its original position near the marker of the National Audubon Preserve. I was able to approach within 75 feet of the Flamingo before it moved. Then it took several steps, rose, and circled slowly about 50 feet over my head, showing the dark wing markings, with long neck fully extended and legs trailing behind. The bird flew southeastward out of sight towards Matagorda Island. The time spent in observation of the Flamingo was over half an hour. There were hundreds of Roseate Spoonbills standing near with which we could make comparison, and there was no possibility of mistaking this red bird with the delicate pink spoonbills.

On the same date a hurricane hit the Texas Coast at Galveston but there was no

stormy condition in the Aransas Bay region. It is possible that the Flamingo flew in ahead of the hurricane. There is also the possibility that the bird had been in this region for several weeks. Mr. Gordon Gunter, of the Game, Fish and Oyster Commission, told me afterwards that some three or four weeks previously Mr. George A. Ratisseau had reported seeing, at a great distance and not very clearly, what he thought was possibly a Flamingo among a group of Roseate Spoonbills, near his Jolly Roger Camp on Copano Bay.

The Flamingo may have been a stray from the Bahama region or it might have come from Yucatan. The latter supposition seems to be the most plausible one.—
CONGER N. HAGAR (MRS. JACK HAGAR), *Rockport, Texas.*

Notes on certain birds of the lower Florida Keys.—During the writer's assignment at Key West, Florida, for the Fish and Wildlife Service from February 1939 until October 1942, notes were made on the avifauna of the Lower Florida Keys, which include those keys lying from about the Bahia Honda bridge southwesterly to the Marquesas, including the Great White Heron and Key West National Wildlife Refuges.

Although much time and study was devoted to the Great White, Ward's, and Wurdemann's herons, about 160 species and subspecies of birds were recorded. As comparatively little information has been published on the area, the following species have been selected as of special interest. Terrestrial bird life was disappointing until it was realized that the area is maritime, consisting of hundreds of keys scattered along the Gulf and Atlantic Ocean with many miles of water.

Roseate Spoonbill (*Ajaia ajaja*).—Although we found no nests on the Marquesas Keys, which lie about twenty miles off Key West and comprise the westerly extremity of the Key West Refuge, we did see birds there as follows: February 20, 1940, one adult bird flying directly over our skiff late in the afternoon. On July 16 of the same year, one bird alighted on the marl flat and commenced feeding, and later in the day Joe Warren, my patrolman, and I saw four birds off Little Creek near Eastern Harbor of the Marquesas, one of which may have been the bird recorded earlier. On April 18, 1941, Joe Warren counted six birds at the Marquesas, and on June 18 of the same year, I saw one in flight there.

On July 25, 1942, one bird, apparently an adult, was seen feeding about a pond in Key West. On August 13, 14, 15, 25, and 29, 1942, one bird, probably the same individual, was seen feeding about the ponds of Key West, generally in the evening around 8 P. M. It was at times quite tame, allowing a close approach.

Swainson's Hawk (*Buteo swainsoni*).—Wintering regularly, as far as I could determine from natives, this western hawk has been recorded by the writer in Key West, on Stock Island, Sugarloaf and Noname Keys. Those seen appeared to be of the light phase or possibly intergrades. They were tame, appeared sluggish, and were easily approached. Birds, perched on poles along the highway, would fly from pole to pole in front of an approaching car or pedestrian.

Short-tailed Hawk (*Buteo brachyurus*).—I have only a few records of this rare bird in the area. Two birds were seen soaring near Porpoise Key on March 16, 1939, both in the white phase. One bird in the dark phase was seen soaring near Key Largo, off the mainland, on January 1, 1940. At one time it dived toward the earth for a short distance. A bird in the dark phase was seen at Boca Grande Key, in the Key West Refuge, on October 17, 1940.

Mangrove Clapper Rail (*Rallus longirostris insularum*).—Apparently a permanent resident although seldom seen during the winter months. An abundant nester about

Key West and on most of the other keys in that area. This rail is an excellent swimmer and at times very approachable, and as little has been written regarding it, I found it an interesting subject of study.

White-crowned Pigeon (*Columba leucocephala*).—Wintering in Cuba and other West Indian islands, this bird reaches the keys generally in early or middle May and leaves for the south in September. A few winter. They nest on many of the keys and feed at certain choice spots containing their favorite diet of wild fig, Natal plum, sea grape, etc. Although shot in great numbers in Cuba during the winter, continual protection along the keys will help to restore this very interesting species which has such a limited nesting area in this country.

Eastern White-winged Dove (*Melopelia asiatica asiatica*).—On May 19, 1940, I observed one of these birds at close range near the Inn on Big Pine Key. Its markings were very distinctive. Natives stated that they found them occasionally mixed with flocks of Mourning Doves. However, investigations showed the bird to be very scarce.

Maynard's Cuckoo (*Coccyzus minor maynardi*).—This shy but interesting bird was found to be rather rare along the Lower Keys although its secretive habits may account for my scarcity of records, all of which, except one, were made on Sugarloaf Key about twenty miles northeasterly from Key West, in May, June, and August of 1939 and June and August of 1940. On June 24, 1941, a dead bird was examined on Cudjoe Key, which had apparently been killed by a car on the highway. The notes of this bird were somewhat like those of the Yellow-billed Cuckoo, common in the area, but there was enough difference to be easily recognized.

Smooth-billed Ani (*Crotophaga ani*).—This West Indian species was first found by me on July 4, 1939—on a wire near my home in Key West. As I had seen a number of them in Cuba some years before, I was delighted to renew the acquaintance. My records are for July and August, 1939; August, 1940; July, 1941; and June and July, 1942. Generally one individual was seen but on August 6, 1939, and June 26, 1942, two birds were recorded. Search was made for a possible nest but without success. The comings and goings of this bird were somewhat of a mystery to me and I could hear its loud notes as it approached my home from a distance. It appeared to have a somewhat regular route and favorite feeding grounds on the island. Its notes were rather musical in tone and not at all like those of a Florida Grackle, for instance—a species common about the area. At times the Ani notes were loud and repeated, reminding me somewhat of certain notes of the Willet, and were uttered on the wing as well as when perched. The bird also has a whining note and others that might be expressed as *whew-whew*. In Cuba this is called "Jewbird" and is quite common in many areas there.

Cuban Nighthawk (*Chordeiles minor gundlachii*).—The discovery and collection of birds of this race during the breeding season on the Lower Keys is described in *The Auk*, 60 (1): page 105, January, 1943. Although it is now believed that this is the breeding race on the Lower Keys, the actual finding of eggs and further collecting is necessary to substantiate this statement. Their notes appear slightly different from those of the northern races.

Arkansas Kingbird (*Tyrannus verticalis*).—Although listed as a straggler from the west, this species might well be classed as a regular winter visitor along the keys. Birds have been recorded near the Seven Mile Bridge, on Cudjoe Key, Key West, and on Boca Grande Key in the Key West Refuge. My earliest arrival date is October 13, 1940, and my last date in the spring is April 1, 1939. They may also be seen from November to March. Key West, being the terminus, so to speak, of the highway keys, is therefore a final gathering place for the winter of a number of such species. This bird is frequently seen in the company of the following species.

Scissor-tailed Flycatcher (*Muscivora forficata*).—This is another so-called straggler from the west and more common during the winter months than the Arkansas Kingbird. It is a delightful find for visiting bird students. My earliest record of arrival is October 20, 1940, and my last record on May 2, 1942. They have also been recorded in all the months from November to April. On December 19, 1941, fifteen birds were counted in Key West, most of them about a cattle field near Fort Taylor where it was their custom to congregate to feed on the many insects there. On and about the wires and trees near the postoffice building was another favorite gathering place. All my records are about Key West.

Key West Vireo (*Vireo griseus maynardi*).—This, the breeding race of the White-eyed Vireo along the Florida keys, is apparently a permanent resident. It is common on many of the keys and especially about Key West, Stock Island, Boca Chica Key, and Big Pine and Noname keys. Like its northern relatives it is very tuneful; some notes remind one of certain calls of the catbird, towhee, wren and chat. One native calls this bird 'spider.'

Black-whiskered Vireo (*Vireo calidris barbatulus*).—A summer resident; my first recorded date of arrival from the south is May 9, 1941, and my last in the fall, September 4, 1942. The dark 'whisker marks' are discernible at close range and differentiate it from the Red-eyed Vireo. It was common about Stock Island, Big Pine, Sugarloaf and Geiger's keys, and also recorded on Hawk and Bay keys of the Great White Heron Refuge. Its song is somewhat similar to that of *Vireo olivaceus* but appeared louder and more 'jerky' and just as emphatic.

Golden Warbler (*Denroica petechia gundlachi*).—The discovery of breeding birds, nest and egg, and the collection of male and female, which were identified by Dr. John W. Aldrich of the Fish and Wildlife Service, is recorded in *The Auk*, 59 (1): 114, January, 1942. This occurred in June and July of 1941 on the Bay Keys of the Great White Heron Refuge. Since then, a male and female were seen on June 16, 1942, on these same keys, and on July 14, 1942, an adult female was noted on the same keys. On August 6, 1942, a male and female, as well as an immature bird, being fed by an adult, were found on Big Mullet Key in the Key West Refuge, which is several miles from the Bay Keys. A letter received from Mrs. Frances Hames states that she found one bird, in song, on one of the Bay Keys on May 30, 1943. I consider it, therefore, a regular nester on certain keys in that area. Additional investigations may determine it as a common breeder.

Maynard's Red-wing (*Agelaius phoeniceus floridanus*).—This, the race known to inhabit the extreme lower portion of the Florida mainland and the keys, is a permanent resident. It is common along the main highway keys and on a number of the keys of the Great White Heron and Key West refuges, having been found on Little Pine Key and southwestwardly to the Marquesas. A nest on Saddlebunch Key contained one young, just hatched, and part of an eggshell on May 30, 1939. On Boca Chica Key, a nest contained one egg on July 24, 1942.—EARLE R. GREENE, 22 Virginia Court, New Orleans, Louisiana.

White Pelican at James Bay, Canada.—In the latter part of June, 1943, Samuel Hardisty, an Indian, found a dead White Pelican in the vicinity of Hannah Bay, which is the southernmost tip of James Bay, the southern arm of Hudson Bay, Canada. The bird when found was in an advanced stage of decomposition, but Mr. Hardisty picked it up with the intention of taking it to Moose Factory, Ontario, for identification. Unfortunately, Mr. Hardisty's dogs consumed the bird en route and only a piece of the upper mandible was saved and taken to Moose Factory,

where it was handed over to Corporal W. G. Kerr of the Royal Canadian Mounted Police. Corporal Kerr sent this fragment to Ottawa, where it was referred, through official channels, to the writer.

This piece of an upper mandible includes the tip and is practically entire except about its broken basal end. It is eleven inches long. Comparison with material in the collection of the National Museum of Canada makes clear that it is undoubtedly part of the bill of a White Pelican (*Pelecanus erythrorhynchus* Gmelin). The specimen is being deposited in the National Museum of Canada.

Apparently the White Pelican has not hitherto been reported from James Bay, and, although the A.O.U. 'Check-List', fourth edition (1931), indicates that Hudson Bay is the type locality of the species, previous records of White Pelicans from that bay lack desirable definiteness. The specimen from "York Fort" recorded by J. R. Forster (Phil. Trans. London, 62: 419, 1772) may merely have been traded there after having been taken on its normal inland range. A similar condition attaches to the specimen recorded by A. Murray (Edin., N. Phil. Jour., 1859: 231) from "Hudson's Bay."—HARRISON F. LEWIS, *Ottawa, Ontario*.

Brown Pelican in Wisconsin:—On the evening of July 31, 1943, Mrs. T. E. Coleman, residing at Maple Bluff on Lake Mendota, informed me that there was a pelican sitting on a tree on the shore of the lake. It proved to be a Brown Pelican (*Pelecanus occidentalis*). It departed within a few minutes. The bird was seen once in flight the following morning but it did not return to the tree until evening when it was collected. It was a female in second-year postnuptial molt, according to Mr. O. J. Gromme of the Milwaukee Public Museum, to which institution the specimen was presented.

One of the local papers learned of the taking of the bird and published an account of it. In the August 6 issue of the Wisconsin State Journal, appeared a letter from E. D. Ochsner, taxidermist, of Prairie du Sac, which stated that years ago he mounted a Brown Pelican shot by S. Fisher on the mill pond at Black Hawk, Sauk County, and that the bird was in the possession of his daughter, Mrs. Herman Fuchs. I went to Black Hawk on August 15 and examined the bird which I found in excellent condition with the plumage showing the beginning of the second-year postnuptial molt. Mrs. Fuchs stated that there had been two birds on the pond but that only one had been shot. This was in late May or early June, "about 1903." The season was fixed by the fact that the bird was taken on the day of a school picnic. The sex was not determined at the time.

At present, the above specimens are the only ones known for the state.—A. M. SCHORGER, *Madison, Wisconsin*.

Fulvous Tree-ducks in the Louisiana rice fields.—In May of this year (1943), I made a trip to Louisiana for the purpose of collecting some Fulvous Tree-ducks (*Dendrocygna bicolor helva*). I had been told that the birds were numerous in the rice fields in the vicinity of Crowley, which is considered as the Rice Capital of the United States. I first went to Abbeville where Mr. J. J. Lynch of the Fish and Wildlife Service kindly took charge of me, drove me to the rice fields, and did everything to help make my trip a success. The trip from Abbeville to the rice fields, however, was too long for a daily trip there and back, so I moved to Crowley where Mr. W. A. Douglas of the Agricultural Experiment Station kindly piloted me and assisted me in every way.

Crowley is the center of a vast rice-growing region, and, as the conditions there are purely local in character, a word of explanation is necessary. Rice is sown in

two ways—drilled in as is wheat, and sown broadcast—and it is the newly-sown seed rice that the ducks come from many miles away to feed on at night. During the day, very few if any ducks are to be found on the paddies and only once did we find a small company of six feeding there in daylight, but at dusk they come in by the hundreds. They will not touch the sprouted rice nor injure the growing crop but, as stated, feed only on the newly-sown seed. For this reason they are exceedingly injurious to the only crop grown in the country, and the farmers try to protect themselves in a measure by organizing shooting parties at night in an endeavor to kill as many as possible and frighten the rest away. Many birds are killed every night during the planting season. They are excellent eating, and one farmer told me he had twelve in his ice box at home from a 'shoot' the night before. The discharge of firearms apparently is the only practical method of preventing serious injury to a rice crop.

The Fulvous Tree-duck is a night-feeder, and during the day is miles away in the almost inaccessible lagoons of the coastal marshes, but with the approach of dusk begins to arrive for the nightly repast in the rice fields. Anyone wanting to shoot tree-ducks in the rice fields of Louisiana must make up his mind for some night-shooting, which is not easy shooting. Accordingly, our search was for fields freshly sown, with no attempt made to hunt the lagoons elsewhere.

Southwest of Crowley, near Thornwell, the birds were particularly abundant owing to much new sowing, and a farmer directed us to a favorable spot. We reached the place before dusk and distributed ourselves along the low dykes or levees that divide the fields into paddies. Not a duck was to be seen or heard, and it was hard to believe what we were told, that in a few minutes the place would be swarming with them. "Just wait a few minutes" was the admonition, and presently we could hear them before we could see them. On they came, in no particular formation as with ordinary ducks—singly, in pairs, in companies of a dozen or more, and in irregular groups, and in twenty minutes they were flying and squealing everywhere, hundreds of them.

Judging from the gunshot reports that could be heard here and there, some of the farmers were also at work, for they go out whenever they can to protect their crops as far as possible by gunfire. Faint booming from far away as well as near-by shooting told of the wide dispersal of the birds in their nightly foray. It is probable that there are thousands of the birds distributed over this vast area during the spring and summer. Phillips in 'Natural History of the Ducks' makes no mention of this condition existing in the Louisiana rice fields; Bent does not refer to it, and Oberholser, in 'Birds of Louisiana,' says nothing about it.

I was too early by a month or more to find the ducks breeding, but every one spoke of them as being common breeders, and the organs of those taken were well advanced in development, although no egg formations were as yet evident. Locally these tree-ducks are known as 'squealer,' 'squealer duck,' and 'Mexican squealer,' and while some writers attempt to describe their peculiar call note as a 'whistle,' from my own observation I would say that 'squeal' describes the note or call perfectly. Once heard and familiarized, I do not think it could ever be forgotten.—EDWIN M. HASBROUCK, M.D., *Washington, D. C.*

Two abnormal breeding records for South Carolina.—The writer is indebted to Mr. E. J. DeCamps of Beaufort, South Carolina, for the information and the privilege of recording the following notable ornithological data for South Carolina.

HOODED MERGANSER.—On April 6, 1937, a party of workmen was clearing a patch of timber at Gray's Hill, Beaufort County, South Carolina. One of the trees, in falling, struck a dead pine nearby and toppled it to the ground. The dead tree broke apart on impact exactly where an old Pileated Woodpecker hole had weakened the trunk. Looking at the debris, the foreman, Mack Woods, was surprised to see the body of a duck, killed by the fall, amid a welter of broken eggs and nesting material. He did not recognize the species other than by the local name of "sawbill," and carried it to town where it was identified by competent authorities as a Hooded Merganser (*Lophodytes cucullatus*). Five of the six eggs were completely smashed but one was only cracked and was given by Mr. Woods to Mr. William Elliott of Beaufort. The egg was heavily incubated and Mr. Elliott rather despaired of preserving it. However, Mr. DeCamps heard of it and asked to be allowed to attempt preservation. He was readily given the chance and made an excellent job of it. The embryo was well-developed and the characteristic bill was plainly evident. Mr. DeCamps succeeded in 'trading' for the specimen with Mr. Elliott and it is now in his (DeCamps's) collection.

This is apparently the first nesting record for South Carolina since the days of Audubon, over one hundred years ago, who recorded its breeding from notes of Dr. John Bachman of Charleston (*Birds of America*, 6: 404).

SHARP-SHINNED HAWK.—Little more than a month after the above find, Mr. DeCamps was told by a local woodsman that a "blue darter" was nesting on the woodsman's land. He thought, of course, that the man referred to the Cooper's Hawk (*Accipiter cooperi*) which occasionally nests in the Carolina Low Country, but the man insisted that it was the "little" blue darter and not the "big"—in other words, that it was the Sharp-shinned Hawk (*Accipiter velox*). He told Mr. DeCamps that he would show him the nest if he would promise to kill the birds!

Although it sounded like a case of mistaken identity, he agreed and was taken to the locality. The nest was built in a pine tree amid second growth, and was thirty feet from the ground. On climbing to it, Mr. DeCamps saw at once that the man was correct but the nest held only one egg! He therefore refrained from shooting the birds as he wished a complete set of the eggs. Several days later he returned to find three eggs, but apparently the nest was then deserted as the set was not increased and the birds failed to appear. He collected the eggs which I have seen. They are typical specimens of the eggs of the Sharp-shinned Hawk. The locality was eight miles northwest of Beaufort, South Carolina. This town lies in the extreme southeastern corner of the state and is on salt water, some seventy-five miles south of Charleston. The eggs were collected on May 14, 1937.

This record is, of course, phenomenal. Search of the literature reveals no other instance of the nesting of this bird in South Carolina although this is not surprising. In his 'Birds of South Carolina,' page 72 (1910) the late A. T. Wayne states that he secured a young bird near Mt. Pleasant, South Carolina, on August 18, 1896, which he believed to have been "bred not far away" on account of its marked immaturity. This however, is not conclusive. In the Greenwood (S. C.) Index-Journal (newspaper) under date of February 14, 1934, there is a list of birds of Greenwood County prepared by F. W. Hahn, Jr., which states that the Sharp-shinned Hawk is a "rare resident, breeds," but no further amplification is given, nor is any specific instance noted. The above, therefore, appears to be the first authentic nesting record for the state and is likely to remain so for a long while!—ALEXANDER SPRUNT, JR., *The Crescent*, Charleston, S. C.

RECENT LITERATURE

William Bartram and his work.¹—In 1772, Dr. John Fothergill of London commissioned young William Bartram to undertake a journey through parts of the South for the primary purpose of collecting botanical specimens and other natural products of the region. He was instructed further to keep a record of his experiences and observations, and this task he undoubtedly performed although his journals have disappeared. His formal report, the 'Travels through North and South Carolina . . .,' first published in 1791, did not entirely please him, perhaps owing to changes made without his approval, but an intended revision was never made. Bartram did, however, send full manuscript reports to Dr. Fothergill, at least of the first two years of work, and since these are in his own handwriting, they undoubtedly represent the nearest approach to his lost journals that are available. It is these two volumes of reports that are printed here with all their inaccuracies and inconsistencies.

Because of Bartram's carelessness and his use of now unfamiliar terminology, many things in his 'Travels' have been difficult to understand. Mr. Harper has ably succeeded in unraveling the tangled threads. For a period of years he followed in person a large part of Bartram's route and he has collected and interpreted a great deal of information which is incorporated in the annotations that accompany Bartram's original account. Most of these notes are collected in a section of 'Comments,' but parts are in the form of an annotated index to the names of plants, animals, minerals, persons, localities, and the like, as used in the manuscript but here translated into current terms. A general index to the present volume is separate as are lists of literature and maps and atlases cited. The illustrations consist of reproductions of some of Bartram's original drawings, a number of maps, and modern photographs of places along Bartram's line of travel.

Many of the notes, of course, concern birds as do some of the drawings, but the general nature of Bartram's observations, covering every aspect of the country and its inhabitants, human and otherwise, makes his account of very wide interest. Mr. Harper has performed a real service in his study and interpretation of the work of one of the picturesque figures among the early naturalists of this country.—J. T. ZIMMER.

Alaska Bird Trails.²—After twenty years of urging by his friends, Herbert Brandt published about Christmas Day of 1943 a thrilling account of the adventures of an expedition by dog sled to the delta of the Yukon River at Hooper Bay. Since the days when Lucien M. Turner's 'Contributions to the Natural History of Alaska' (1886) and Dr. Edward W. Nelson's 'Report upon Natural History Collections made in Alaska' (1887) excited the enthusiasm of ornithologists, no elaborate report on the birds of the Bering Sea coast has been published. 'Alaska Bird Trails' far exceeds in importance and in the wealth of information presented any earlier publication on the birds of this region, which is fairly representative of most of northern Alaska. Although Hooper Bay is some distance south of the Arctic Circle, it is typically Arctic in its fauna and flora.

¹ Harper, Francis. 'Travels in Georgia and Florida, 1773-74. A report to Dr. John Fothergill. By William Bartram. Annotated by Francis Harper.' Trans. Amer. Philos. Soc., n. s., 33, pt. 2, pp. 1-242, pls. i-xxvi, Nov. 29, 1943. Price \$2.00.

² Brandt, Herbert. 'Alaska Bird Trails. Adventures of an expedition by dog sled to the delta of the Yukon River at Hooper Bay.' Royal 8vo, xviii + 464, 40 pls. (12 col.), 21 text-figs., map (end-pap.), Dec. 21, 1943. The Bird Research Foundation, Cleveland, Ohio. Price \$10.00.

Mr. Brandt, a successful business man with a keen enthusiasm for ornithological exploration, spared no expense or effort in planning, organizing, and conducting what was apparently the largest and best equipped ornithological expedition that ever penetrated that almost inaccessible region. His partners in the enterprise were Olaus J. Murie, representing the Biological Survey, and H. Boardman Conover, of Field Museum of Natural History, and they were ably assisted by such experienced men as Frank Dufresne, W. C. Denny, Jack Warwick, and A. H. Twitchell. With five men working exclusively on birds and with an entire Eskimo village helping them, it is no wonder that the expedition was successful and the results impressive. Data were secured on about 1500 occupied nests and fine series were collected of some 60 species of birds.

The book is published by The Bird Research Foundation, which has spared no expense in producing a handsome volume. It will be an ornament to any library and will stir the enthusiasm of anyone interested in Arctic birds. It is generously illustrated with twelve beautiful colored plates by Major Allan Brooks and Edwin R. Kalmbach, showing some of the most characteristic birds of the region, including downy young. The downy young of the Emperor Goose and the Black Turnstone were apparently the first ever collected, and some of the others had never been figured. Mr. Brandt remarks: "In the case of our Black Turnstone plate, this seems to be the first painting published showing the subject in complete nuptial attire." The first painting of this species submitted by Major Brooks was made from specimens collected on the coast of British Columbia in mid-May, and "his birds were nearly uniformly black above, showing little of the white decorations which so enhance their beauty on the tundra during the breeding season in the latter part of May." Major Brooks had to revise this painting, as well as three others, "due to the fact that the birds apparently undergo a final plumage change of almost overnight rapidity as they approach their nesting ground or near their egg-laying time."

In addition to the colored plates, there are numerous halftone reproductions of photographs by Frank Dufresne, Olaus J. Murie, and the author; also pen sketches by C. G. Mitchell, J. R. Moody, and L. B. Towle which enrich the illustrations. A map on the back page and cover shows the route of the expedition.

The Introduction gives an interesting account of the history of Alaska, its topography, climates, and life zones, and a review of the literature on the subject. The narrative is written in diary form, relating the daily events as they unfolded and many chapters are headed by the name of some bird that was the outstanding feature of the day. The first chapter tells the story of the journey through the inside passages and overland to Fairbanks, where the party convened on March 18, 1924, and assembled their outfit. Then follow six chapters of thrilling adventure on their 850-mile trip by dog sled from Nenana to Hooper Bay, which they reached on April 28. This gruelling trip was made under Arctic winter conditions, with the temperature from 15 to 35 degrees below zero, deep snow, generally windy weather, and often howling blizzards. Fortunately, they were able to spend most of the nights in little villages, road houses, or trailside camps. An interesting feature of the trail was that each road house or small hotel had to supply a dog barn, "filled with small stalls in which each dog was segregated, and thus prevented from fighting. It is as necessary for an Alaskan hotel to have dog stables as for an eastern hostelry to have a garage." Only one splendid team of eight huskies survived the journey of nearly forty days of heavy work, with "twenty of

these days in raging Arctic storms." They used at one time or another more than ninety different dogs for transportation.

There are two chapters—interesting ones, too—describing the natural features of Hooper Bay and the habits of the primitive Eskimos living there. The headquarters of the party were at the government school, in charge of Mr. and Mrs. L. A. Ebright, and in the Eskimo village, where the natives were encouraged with tobacco and tea to hunt for nests and help in the preparation of specimens.

Two remarkable chapters are devoted to the migration of ducks and geese along the coast, which must have been most spectacular. Among all the vast hordes of wild fowl that migrated past Hooper Bay, the King Eiders far outnumbered all others. Although they were observed for only a few hours on all but four of the days from May 4 to 19, inclusive, Mr. Brandt estimated that 124,900 birds of this species passed over Point Dall during that time, and as many as 75,000 on May 15. He vividly describes the flight as follows: "Dim in the distance, over the silvery pavement of ice, a smudge of bird dust gathers. This soon evolves into dark, restless pencillings, which then in turn become a shabby, vacillating line across the sky, as onward rushes a wide wave of wild fowl, Arctic bound. Rapidly the serpentine ribbon looms and expands, bending, tilting, stretching, now wavering, then steadying, gradually enlarging, ever hastening, a twinkling rank or fearless feathered travelers in which there is no confusion, no laggard, nor yet a moment's rest. They are almost upon us; now we hear the quackings, then the deep, savage roar of a thousand throbbing wings as the powerful pilgrims thunder over and onward toward their Promised Land. Birds, birds, and more birds, by the thousands, by the tens of thousands, glorious feathered clouds on the march."

Then, of the coming of the shorebirds, he wrote on May 15: "Each marshy pond had its quota of various shorebirds, each one of which a few days before would have been to us a thrilling rarity. The mystic tundra unfolds its lavish avian wealth with bewildering rapidity." Why, he asks, do these great wanderers leave their congenial winter homes in the far south for a brief breeding season on the Arctic coast? Not for their own food, for they are fat on arrival; not for mating, for they are paired when they arrive; not because they like it, for they spend less than a quarter of the year on their breeding grounds, and they leave just as soon as possible. "There seems to be only one comprehensive answer, and that is proper food. Each tender, undeveloped baby of a given species seems to require its own strange food combination, which occurs only where some certain animal or plant life prospers."

Certain species of shorebirds were found to lay their eggs and rear their young only in definite subzonal areas, in definite types of terrain, or where definite types of vegetation prevailed.

Succeeding chapters tell in narrative form of the many interesting facts learned about the habits of the fifty-four species of birds found breeding in the Hooper Bay region. Some light is thrown upon the much discussed relationship between two of the recognized forms of the Canada Goose (*Branta canadensis*). Mr. Brandt writes: "Inland, from 10 to 40 miles on the tundra, the Lesser Canada and Cackling geese are about equal in abundance, but near the coast the former is seldom found, whereas the other is plentiful. * * * The Eskimos told us also that the two geese do not mate together, which if correct is good evidence that they are specifically distinct." Furthermore, he found that the nests of the two forms are quite different in structure and in the color of the nesting down. It may be recalled that the reviewer (Bull. 130, U. S. Nat. Mus., p. 231, 1925) remarked: "It is also of

interest to note that the downy young of *occidentalis* and *minima* resemble each other very closely and are quite different from the downy young of *canadensis*; this suggests the possibility of a distinct, dark-breasted, western species."

It is a well-known fact that the down taken from the nest of the eider is far superior for commercial use to that plucked from the birds of either sex at any other season, being softer, more fluffy and a poorer conductor of heat. On examining a female eider, Mr. Brandt "learned by gently pulling a single tuft of this fluffy under plumage at a time, that an occasional one was lightly inserted and was easily removable. On comparison this loose tuft appeared to be light and fluffy, just like that which was found in the nest. On the other hand, the rest of the down feathers had the roots of the shafts so deeply embedded in the skin that when forcibly removed, a bit of grease and other animal matter adhered to them. * * * On the down from the nest there are no dried particles of animal matter; and as the skin of the bird showed no irritation, the nest lining process is, no doubt, painless. * * * My conclusions are that the prized eiderdown taken from the nest is grown by the female bird alone, only during the breeding season, and for the sole purpose of nest lining. Thus there are evidently two kinds of down on the female at this time—the warm under plumage of downy feathers common to most birds, which we will call *permanent down*, and another which for lack of a distinctive name we propose to call *nuptial down*."

These are only a few of the interesting facts learned by this outstanding expedition, but space will not permit any further discussion of them.

A reviewer is supposed to discuss the shortcomings of a publication, but he finds little to say on this subject. It might have been better if the author had adhered strictly to the nomenclature of the 1931 Check-List, our accepted authority for the present; some of the names may never be accepted and, until they are, they had better not be used.¹

Perhaps the most important part of the work for the working ornithologists is the Appendix, covering in 134 pages a fully annotated list of all the birds observed on the entire expedition, giving dates of arrival and full notes on haunts, nesting and other behavior, as well as very full descriptions of the eggs and downy young, and lists of the specimens of the birds collected.

A very satisfactory index completes the usefulness of the work.—A. C. BENT.

*Argentine birds.*²—This interesting work presents a series of poems in Spanish dealing with twenty-two familiar Argentine birds. It is obvious that the poet knows the birds and their ways and he treats them sympathetically. The book is dedicated to his two sons and, through them, to all children, and it would be strange if the young people of our sister republic, and older ones as well, did not derive enjoyment from this familiar treatment. A list of the species, with the local and Latin names, is appended.

The colored plates, by Salvador Magno, are lifelike portraits of the different species from which the readers of the poems should have no difficulty in recognizing their feathered friends.—J. T. ZIMMER.

¹ The editor heartily endorses this statement. While it is proper (although often unfortunate) to advance arguments in favor of changes from established usage, the adoption of such changes without any presentation of the evidence for or against them, defeats the efforts of nomenclaturists who are struggling to develop a stable nomenclature. In popular works or studies not concerned primarily with taxonomic revisions, the use of such debatable names only leads to confusion.—Ed.

² Burghi, Juan. 'Pajaros Nuestros.' Demy 4to. pp. 1-118, 34 pls. (col.), 23 vignettes, 1942 [second ed.]. Guillermo Kraft Ltda., Buenos Aires.

A biography of Walt Whitman.¹—For many years Whitman was a close personal friend of John Burroughs, as well as a contemporary and acquaintance of Henry David Thoreau. Having much in common with these men, including an appreciation of bird study, it is fitting that a brief notice be given here of this new Whitman biography. The scope of the book gives particular emphasis to the philosophy, the poetry, and the personality of this literary problem child, while comparatively slight attention is given therein to his natural history interests. Because of this, the new book may prove a bit disappointing to some of its readers. However, there appear here and there interesting and noteworthy hints and fragments, so that one may visualize the young poet as he liked to lie on the grass beneath the apple trees of his Long Island ancestral home, looking up into the sky and studying the birds and the clouds, preliminary to his 'Leaves of Grass.' Or, perhaps, we may see him leaning over the rail, busy studying the seabirds and the sunset while 'Crossing Brooklyn Ferry.' Again, later on, there is evident the lover of the great out-of-doors while he sings the 'Song of the Open Road.' Then too, in middle life, there are long bird rambles on holidays with his comrade John Burroughs, then a fellow Government employee, over the countryside around Washington, and there are discussions by them of many things including the identity of bird songs, particularly that of the Hermit Thrush—material afterwards used effectively by Whitman in his Lincoln poem, 'When lilacs last in the dooryard bloom'd.' There is likewise pathetic interest in the picture of the, by that time, aged paralytic in vain quest for health, when for four summers he would sit alone in quiet meditation through long days of bright sunshine amid the birds and flowers in the fields and woods of his friend George Stafford at Timber Creek on the Delaware near Camden, New Jersey—experiences that later were described by him in his 'Specimen Days.' This record, comments Dr. Canby, is "more interesting as biography than as nature study." Best of all, there does appear in the biography evidence of the richness of the benediction that came to the poet while he listened with soul attuned to "the mocking-bird mourning for its dead mate by the ocean shore," and learned therefrom "surcease from desire in the peace of death." Fortunate and happy indeed may be any bird student who through his studies becomes able, like the poet, to penetrate beyond the commonplace and beyond the material and to apprehend true spiritual verities.—J. S. WADE.

Birds of Cumberland County, Pennsylvania.²—County check-lists of birds are too often just what the name implies, mere catalogs of dates of occurrences, but in Mr. Frey's modest little book we have not only this information but also a comparison of the status of each species today with that of one hundred years ago. A century ago, Cumberland County was the home of the Bairds, Spencer F. and William M., of whom the former achieved fame as one of the great men in American ornithology. Two published lists attest to their work during this period. Mr. Frey has studied these in detail, and it has been his aim to bring up to date the ornithological knowledge of the county.

Mr. Frey's book is divided into two parts. Part I consists of a carefully annotated list of the nearly three hundred species recorded for the county, with information

¹ Canby, Henry Seidel. 'Walt Whitman, an American: A study in biography.' 8vo., cloth, 381 pp., 16 pl., bibliog., 1943. Houghton Mifflin Co., Boston. Price \$9.75.

² Frey, Edward Snively. 'Centennial Check-List of the Birds of Cumberland County, Pennsylvania, and Her Borders, 1840-1943.' 8vo, paper, pp. 1-68, 1 plate (map), 1943. Obtainable from Reverend Edward S. Frey, 517 Hummel Ave., Lemoyne, Penna. Price \$1.00.

as to relative abundance, nesting data, and seasonal occurrence. Usual arrival and departure dates are given as well as extreme dates which represent the time during which smaller numbers of individuals may be expected. There is also a description of the physical features and habitats of the county. Mr. Frey believes that Cumberland County lies partially in the Carolinian and partially in the Alleghenian life zones, and he says that in areas of the South Mountains there are strong suggestions of a Canadian element in both flora and fauna. Part II of the book consists of a reprint of Spencer F. Baird's 1845 list with brief statements as to the present-day status of each species together with comments as to changes in status, relative abundance, and local distribution which have occurred during a century. There is also a hypothetical list as well as a table showing the results of four years of hawk-migration observations at Sterrett's Gap, 1938-1941.

In the main, Mr. Frey has made carefully prepared and well-drawn statements concerning each species, but there are a few birds which it might have been the better part of wisdom to relegate to the hypothetical list, based as they are on inconclusive evidence. These species include the Barrow's Golden-eye, Swallow-tailed and Mississippi Kites, Wilson's Plover, and Smith's Longspur. Mr. Frey is entirely justified in assigning the Kirtland's Warbler to his hypothetical list, but it could just as well have been omitted, since the supposed record was based on misinformation (cf. Stone, *Auk* 15: 331, 1898). A bird not listed by Mr. Frey but recorded from Harrisburg, and within his two-mile limits although in Dauphin County, is the Willow Thrush (cf. Rothrock, *Auk*, 35: 83, 1918).

There are a regrettable number of typographical errors in Mr. Frey's book, the result of an unsatisfactory printer and editorial inexperience on the part of the author, but these minor faults are definitely outweighed by the contribution which Mr. Frey makes to our knowledge of the birds of the county and the interesting way in which the material is presented. Mr. Frey's little book is one which every serious student of bird distribution should have in his library.—ALBERT E. CONWAY, *West Chester, Pennsylvania.*

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NOTES AND NEWS

Notice has come of the death on December 11, 1943, of Mr. Harry Forbes Witherby, founder and editor of 'British Birds' and Honorary Fellow of the American Ornithologists' Union. Mr. Bernard W. Tucker has taken over the duties of editor of the journal.

Dr. Charles Haskins Townsend, Member of the American Ornithologists' Union, died on January 28, 1944, in his eighty-fifth year.

The U. S. Department of the Interior has issued a revised list of the 'National Wildlife Refuges Administered by the Fish and Wildlife Service,' Wildlife Leaflet 179. The Service now administers 275 national refuges with an aggregate of 17,620,526 acres, of which 188 (of nearly 3,000,000 acres) are primarily for waterfowl and seventy others for other birds as well as other forms of wildlife. Permission to visit any of these refuges may be obtained by writing or calling upon the refuge managers. The areas offer fine opportunities for bird photography and study.

CORRESPONDENCE

THE EUROPEAN WIDGEON IN NORTH AMERICA

EDITOR OF 'THE AUK':—

The thesis of Dr. E. M. Hasbrouck's recent article on the European Widgeon in North America (Auk, 61: 93, 1944), that this species probably breeds somewhere in the New World because of the widespread records of its occurrence, appears sound. But his listing of only thirty-two reports (including fourteen sight records) from eastern New York and Long Island gives a very inadequate notion of the bird's status. In fact, on Long Island the European Widgeon has for many years been a regular winter resident and spring and fall migrant, which can be seen on any winter day by merely going to one of its favorite haunts, such as the Hempstead Reservoir and the adjacent ponds. Cruickshank in his 'Birds Around New York City': 94-95, 1942, points out that it "now occurs every year as a transient and winter visitant . . . Though generally occurring singly or in twos or threes, there have been extraordinary flights on Long Island when I have seen as many as fourteen in a day . . . In recent years I have regularly found at least one drake on the Hempstead Reservoir from late October to late March." Off Long Island the bird is rare around New York, but occasionally occurs even in the urban parks, viz., drakes have been seen in Van Cortlandt and Bronx Parks this very winter.

There may be significance in the circumstance that the local status of that other supposed accidental, the European Teal, has until very recently resembled that of the Widgeon, even the same waters being favored (Cruickshank, *t.c.*: 98-99, 1942). But since 1941, unlike the Widgeon, the Teal's numbers have drastically diminished, and in 1943 not a single one was reported in the region, though its usual haunts had been frequently visited by many observers.

EUGENE EISENMANN

New York, N. Y.

THE POSSESSIVE IN VERNACULAR NAMES

EDITOR OF 'THE AUK':—

The possessive case has been used in all editions of the Check-List of the American Ornithologists' Union to date in vernacular names of birds indicating ascription to an individual. In practically all cases their origin is in a technical name but not necessarily that recognized as standard by the Committee on Classification and Nomenclature. While scientific nomenclature is not the Latin language, rules harmonious with the practices of that language are observed in forming technical names. Thus if a bird is named for, or in honor of, or is dedicated to, an individual, the technical name is a Latinization of the person's name, employing the genitive case. On the other hand, the vernacular names are regarded as part of the English language.

It would prevent confusion if it were realized that the English possessive is equivalent to the Latin genitive. Consider what our best dictionaries have to say on the point. As a definition of "genitive," the Century Dictionary and Cyclopedia (1913 ed., vol. 4) states: "an epithet applied to a case in the declension of nouns, adjectives, pronouns, etc., which in English is called the possessive case, or to the relation expressed by such a case: as *patris*, 'of a father, a father's,' is the genitive case of the Latin noun *pater*, a father . . . a case in the declension of

nouns, adjectives, pronouns, etc., expressing in the widest sense a relation of appurtenance between one thing and another, an adjectival relation of one noun to another, or more specifically source, origin, possession, and the like; in English grammar, the possessive case." If a later authority is deemed preferable, Webster's New International Dictionary (2nd ed., 1937) may be cited. "The genitive in English now prevailingly denotes the relation of possession, and is therefore commonly called the *possessive*."

In the light of these facts, it would seem that there should not be objection to following, in names derived from those of persons, the custom of the language as to indication of the possessive. While usage varies in this respect as it does with every other feature of language, it is fairly crystallized, is plainly defined in dictionaries, and can be followed by different writers with essentially uniform results.

It is true that the United States Geographic Board has abandoned the use of the possessive in the terms upon which it rules, but the case is different as those names are not based on Latinized genitives. Moreover, the Board's usage is not universally approved and the difficulties cited below in connection with the vernacular names of birds also apply to the geographic terms. Some still think the possessives more appropriate and euphonious, e.g., The Hudson's Bay Company.

The most common objection to the use of the possessive case is that the bird does not actually belong to the man. It is not likely that anyone so maintains, but since the implication in that direction is almost as strong in the Latin genitive of the scientific name as in the possessive of the vernacular, what merit is there in advancing the argument—a puerile one at best?

The claims that the possessive names are useless and confusing can well be answered together. Putting vernacular names in the possessive case is useful precisely because it prevents confusion in the instances of all personal names, which as mere words have definite meanings that may apply to birds. There is a great deal of difference, indeed, as we use or omit the possessive case in bird names embodying human surnames that have attributive, descriptive, or locative significance in common language. The following gleaned from the index of the current Check-List (4th ed., 1931) illustrate the point: Bank, barn, bean, bell, black, blue, brown, canada, clapper, cliff, dawson, English, fish, fox, gray, green, house, kern, king, large, long, marsh, palm, pine, rock, sage, snow, stone, storm, summer, tree, wayne, white, wild, winter, wood.

Others only a little less familiar as names of people could be cited, and there are many among popular names of birds that come in this same deceptive group. That the meaning of ascriptive names is clear without the use of the possessive case needs no further refutation. On the contrary, many of them shorn of the possessive sign would be definitely misleading. For instance, I have seen Steller jay altered to stellar jay by an editor who could see no sense to the former appellation and decided to give it meaning.

The objection as to difficulty of pronunciation applies to only a small proportion of the terms as Coues's, Mearns's, etc. In most cases the pronunciation is simply that of the plural form of the word which is perfectly familiar, e.g., bells, kings, rocks, etc. If supporters of this argument were consistent, they should work for the abolition of all plurals.

A compromise that would seem to offer a way out to adherents of both sides of the controversy would be to omit all personal references in standard vernacular names. Among precedents are: Florida Red-shouldered Hawk (*Buteo l. alleni*),

Arizona Hooded Oriole (*Icterus c. nelsoni*), and Pink-sided Junco (*Junco mearnsi*). This remedy might tempt us to increase the number of bird names referring to localities, which are already too numerous, and could advantageously be replaced by others of descriptive significance.

W. L. McATEE

Fish and Wildlife Service
Chicago, Illinois

RHODE ISLAND BIRDS

EDITOR OF 'THE AUK':—

Dr. Frank M. Chapman feels that Miss Dickens's record of the Black-throated Gray Warbler in Rhode Island should be sent to you to be added to the records of that species near Miami, Florida, made last winter (See Louis A. Stimson, *Auk*, 60, no. 3: 452-453, July, 1943). The actual date of observation of this warbler as made by Miss Dickens at her home on Dickens' Point, Block Island, is May 14, 1943. The June issue of our 'Bulletin of the Audubon Society of Rhode Island' (4, no. 3: 2, 1943) gives her account and also (p. 1) the Editor's comment. In Forbush's 'Birds of Massachusetts and other New England States,' I find the Black-throated Gray Warbler pictured on Plate 84 and the following references with description:—Recorded in Milton, Mass., May 22 and 23, 1918 (a pair, male heard in song)—Miss Ella F. Luther; Lenox, Mass., Dec. 8, 1923, one seen and found dead the next day; specimen now in the collection of the Boston Society of Natural History; Malden, Mass., one seen May 18, 1924, an adult.

The same number of the 'Bulletin' (p. 3) notes the gift of the Harry S. Hathaway collection of Rhode Island birds and birds' eggs, library, and field records to the Audubon Society of Rhode Island. These represent some fifty years of collecting, observation, and study, and possess an increasing historical significance. A detailed description of the collection is in preparation.

ALICE HALL WALTER

67 Oriole Ave.
Providence, Rhode Island

OBITUARIES

JOHN WARD MAILLIARD, a Member of the American Ornithologists' Union since 1901 and an Associate since 1895, died at his home in San Francisco, California, on January 9, 1935. He was born at Bordentown, New Jersey, on January 25, 1862, the youngest son of Adolphe and Ann Eliza Ward Mailliard. Both his father, and grandfather Louis Mailliard, were at various times secretaries to Joseph Bonaparte, the one-time ruler of Spain and brother of Napoleon I. John Ward Mailliard's mother was the granddaughter of Lieutenant-Colonel Sam Ward, of fame in the American Revolution. She was also a sister of Mrs. Julia Ward Howe, author of the "Battle Hymn of the Republic," and of John Ward, familiarly known as "Honest John Ward," President of the New York Stock Exchange in 1830.

In 1868 the Mailliard family moved to California, settling in Marin County. Their first home was in San Rafael where they lived for several years. In 1873, however, they moved a few miles west to Rancho San Geronimo, a twelve-thousand-acre tract presented to Mrs. Mailliard by her brother Sam Ward of New York. The following year, John Ward Mailliard and his older brother Joseph met Charles A. Allen, a private collector of birds and mammals, living at Nicasio, Marin County, which was close to Rancho San Geronimo. Allen's influence had much to do with interesting the Mailliard brothers in the field of natural history. It was only a short time after their first meeting with him that they jointly engaged in building up an oölogical collection. During a number of years following, all of their spare time was devoted to this pursuit.

John Ward Mailliard attended the University of California as a member of the class of 1883. After completing his college education he entered a business firm in San Francisco. In 1888, he married Lizzie Page in San Rafael and then moved to San Francisco where they made their permanent home. Here the combined Mailliard collection of eggs and such study skins as had been secured were housed. In 1892, he became business manager of Rancho Paicines, a ten-thousand-acre ranch in San Benito County. He was later joined here by his brother and in the ensuing several years the combined collection of birds' eggs and skins greatly increased. The results of these years of collecting were nearly lost in the great earthquake and fire of 1906 which devastated much of San Francisco. A sudden shift in the wind when the fire had reached the second block from the Mailliard home was responsible for saving it as well as the specimens it housed.

Much of John Ward Mailliard's life was connected with the California Academy of Sciences to which he was elected a member in 1897. In 1910 he became a member of the Board of Trustees, a position that he held until 1926. During these years he was most generous with his time and money in furthering the interests of the Academy. He was appointed to represent it at the Fourth International Ornithological Congress held in London in 1905, although for various reasons he was unable to attend. Between 1910 and 1914, he served as Vice President of the Academy and in 1918 he and his brother Joseph presented their entire collection, numbering about ten thousand study skins, a large number of birds' eggs and several hundred nests, to this institution.

John Ward Mailliard is survived by his widow and by three sons and two daughters. While he was not an active research worker in the field of ornithology, owing perhaps to the pressure of business affairs, much time in his life was devoted to the building up of the valuable Mailliard Collection and to furthering the cause of avian scientific research.—ROBERT T. ORR.

JEANNETTE SCOVILL ASPINWALL (MRS. CLARENCE AKIN ASPINWALL), an Associate of the American Ornithologists' Union, elected in 1916, died in Washington, D. C., December 24, 1934, at the age of 56. She was the daughter of Mr. and Mrs. Henry W. Scovill and was born at Waterbury, Connecticut, December 30, 1878. She was a descendant in the sixth generation from John Scovill, a pioneer settler in Waterbury.

Mrs. Aspinwall was actively interested in gardening, music, and bird study and took an active part in the work of the various social and other clubs to which she belonged. She was a member of the Audubon Society of the District of Columbia, the Chevy Chase Garden Club, the Eistophos Science Club, the Travel Club, and the Twentieth Century Club. In the Audubon Society she served on the Executive Committee and took part in arranging the bird walks and the spring classes in bird study. She had a happy faculty of imparting information to children and her group in the children's classes was always full. She had a good working knowledge of local birds and was familiar with most of the species found in the vicinity of the national capital. Shortly before her death she accompanied her husband on a trip to western and southern Europe and thus was able to extend her observations to the birds of several foreign countries.—T. S. PALMER.

WILLIAM LEWIS BURNETT, an Associate of the American Ornithologists' Union for nearly 39 years, died at Fort Collins, Colorado, July 5, 1934, in his 65th year. He was born in Manito, Illinois, January 1, 1870. When elected to the A.O.U. in 1895 he was living at Fort Collins, which was his home during the rest of his life.

Burnett's fifteen publications included a letter in the 'Nidologist' describing the nest of the Dusky Grouse, four notes in 'The Auk' in 1908, 1917, 1921 and 1922, and nine notes in 'The Condor' from 1902 to 1915, and a 'Study of the Food Habits of the Ring-necked Pheasant in Colorado' in Circular 31 of the Colorado Agricultural College, in 1921. His contributions to 'The Condor' comprised a sketch of Wm. G. Smith and records of the occurrence of some of the rarer birds in eastern Colorado.—T. S. PALMER.

DR. IRA EUGENE CUTLER, an Associate of the American Ornithologists' Union, died in Denver, Colorado, May 25, 1936, in his 73rd year. He was the son of Frederick and Georgia Ann Frances (Stead) Cutler and was born in Putnam, Connecticut, October 8, 1863. He received his degree of B.S. at Albion College, Mich., in 1893 and later the degrees of A.M. from the University of Denver in 1906 and LL.D. from his alma mater in 1919. After graduation from college, Cutler became manager of a flour mill in 1893-94 and then a teacher of science in Michigan high schools from 1894-1897. For two years he was Superintendent of schools at Crystal Falls in northern Michigan and in 1898 became head of the department of zoology in the University of Denver.

In 1926 Dr. Cutler was elected an Associate of the A.O.U. and a member of the Cooper Ornithological Club. He was also a member of the American Association for the Advancement of Science, the American Society of Mammalogists, the Botanical Society of America, the Genetic Association and the Denver Teknik Club. Primarily a botanist, apparently he published little, if anything, on birds. His specialty was genetics and he developed some promising hybrids of Indian corn. He is said to have had one of the largest botanical gardens in the Middle West. He also made extensive geological researches in the Florissant District of Colorado.—T. S. PALMER.

LABAN DENNIS, an Associate of the American Ornithologists' Union, elected in 1921, died at Orange, N. J., November 18, 1925, at the age of 84. He was born in England in 1840 and came to this country at the age of four. He received his early education in the Boonton, N. J., public schools and then attended the Normal and Training School at Trenton, N. J., where he taught soon after his graduation.

After several more years devoted to teaching, three of them being spent at Newark (N. J.) Academy where he later became a trustee, Dennis took up the study of medicine. Graduating from the College of Physicians and Surgeons, at Columbia University in 1866, he proceeded to build up a practice in Newark as a homeopathic physician and continued it until failing health forced his retirement in 1908.

Besides holding membership in the Union, Dennis was for many years a member of the State Board of Health of New Jersey; he was also a member of the New Jersey Homeopathic Medical Club, and was connected with many other organizations dedicated to public welfare.—WILLIAM F. RAPP, JR.

ARTHUR FARQUHAR.—Twenty-three years have passed since the untimely death of Arthur Farquhar, a youthful bird student of York, Pennsylvania. He was born in York on February 14, 1903 and, when he was only thirteen years of age, was elected an Associate of the American Ornithologists' Union. His father, Francis Farquhar of York, informs me that the boy always had an interest in birds, although he had no particular guidance in the subject.

Arthur Farquhar graduated from the York Collegiate Institute in 1919 and in the fall of that year entered the College of Arts and Sciences at Cornell University. He completed only one term of work for, early in the second term, he contracted double pneumonia and died at the Cornell Infirmary on February 21, 1920. In coöperation with Charles Weiser he published in 'Bird-Lore' two Christmas bird lists from the vicinity of York, Pennsylvania, one in 1918 and one in 1919; and in 1920, with Charles Weiser and Herman Klinedinst. he published a Christmas list of twenty species and 1057 individuals.—ELSA G. ALLEN.

FRANK EDWARD LEMON, an Associate of the American Ornithologists' Union elected in 1930, died at Reigate, Surrey, England, April 22, 1935, at the age of 77. He was born in 1858, educated at St. Paul's School and Trinity College, Cambridge, and called to the bar in 1883. He took an active part in public affairs and was elected a member of the Surrey County Council in 1912, an alderman in 1920, and later served as Mayor of Reigate. For many years he was chairman of the Redbill and Earlswood Commons Conservators and was a prominent Freemason and a Freeman of the city of London.

Mr. Lemon was much interested in bird protection and took a prominent part in the work of the Royal Society for the Protection of Birds. He was its Honorary Secretary for more than thirty years, from the time that the Society obtained its Royal Charter in 1904 until his death. He was also its representative in the Society for the Promotion of Nature Reserves, the Society for the Preservation of Rural England, the Central Chamber of Agriculture, and the International Committee for Bird Protection (British Section).

He took much interest in the educational work of the Society and in 1897 published, in the educational series of Leaflets, one entitled 'Acts and Orders' which included a summary of the Acts of Parliament and Orders made by the Secretary of State relating to the protection of wild birds from 1880 to January 1897. His portrait may be found in the publication of the Society, 'Bird Notes and News,' 11, No. 2, 1924, and 16, No. 6, 1935.—T. S. PALMER.

HENRY VINING OGDEN, who became an associate member in 1897, died at his home in Milwaukee, Wisconsin, on October 10, 1931. He was born of English parents, in New Orleans, Louisiana, on July 13, 1857. When the Civil War began, his father sent the family to Canada and he, himself, entered the Union army. The son received his higher education at Trinity College and McGill University. His M.D. degree was received in 1882 and later in that year he became a resident of Milwaukee.

While at McGill University he studied under Sir William Osler from whom he received great encouragement in his interest in natural history. The friendship thus formed lasted throughout life. Ogden became a zealous collector and his activities ranged from birds to mammals, reptiles, and plants. His enthusiasm for birds was shared by Dr. E. C. Copeland of Milwaukee. Ogden acquired Copeland's skins and in 1931 gave the combined collection of 640 specimens, representing 230 species, to Milwaukee-Downer College. The collection has been described in detail by M. E. Pinney and J. F. McNaughton (*Wis. Acad. Sciences*, 30: 87-116, 1937).

This collection contains skins from Ontario, taken chiefly in 1901, while the Wisconsin specimens, representing 120 species, were taken mainly in the Milwaukee region between the years 1882 and 1905. Ogden seldom failed to add to the collection during his numerous hunting and fishing trips, and he and Copeland collected jointly in Minnesota in 1897, and in North Dakota in 1899.—A. W. SCHORGER.

LAURENCE BEDFORD POTTER, an Associate of the American Ornithologists' Union for twenty-four years, died in the Jubilee Hospital at Eastend, Saskatchewan, Canada, November 5, 1943, on the day following his sixtieth birthday. He was the son of the late Reverend Peter and Georgiana Potter, and was born in St. Thomas Vicarage, Monmouth, England, on November 4, 1883. He came to Canada in June, 1901, and immediately settled on the Gower Ranch in the Frenchman River Valley near Eastend. Here he spent practically the remainder of his life as a cattle rancher.

Potter inherited a deep love of nature from his father, but, so far as known, birds did not seriously occupy his attention until after his arrival in western Canada. In 1906 he began regularly to write up his observations on the avifauna of the Frenchman River Valley and adjoining Cypress Hills and plains. These notes he elaborated and published from time to time in various scientific periodicals. He contributed to 'The Auk,' 'The Canadian Field-Naturalist' and 'The Condor,' with most of his writings appearing in the last journal. He was considered an authority on the birds of southwestern Saskatchewan. His labors markedly advanced our knowledge of the avifauna of that region with which his name will always be associated. His last paper, entitled 'Bird Notes from Southwestern Saskatchewan,' appeared in 'The Canadian Field-Naturalist' a few days before his death.

Potter was elected to the A. O. U. at the meeting in New York in 1919, and attended several later meetings. In 1925 he was elected to membership in the Cooper Ornithological Club and to the Ottawa Field-Naturalists' Club in 1922. Latterly, he became greatly interested in the Yorkton Natural History Society (Yorkton, Saskatchewan) of which he became a member when it was founded in 1942, and contributed notes on Saskatchewan birds to its official bulletin, 'The Blue Jay.' He is survived by his sister, Miss M. I. Potter, of Eastend, who is his only living relative in Canada.—J. DEWEY SOPER.

HENRY MANNING SAGE, an Honorary Life Associate of the American Ornithologists' Union, elected in 1885, died at his home in Menands, near Albany, New York, September 25, 1933, at the age of sixty-five. He had been an invalid for

several years but the immediate cause of death was a heart attack. He was the son of Dean and Sarah Manning Sage and was born at Menands, New York, May 18, 1868. After attending elementary schools and the Albany Academy, he graduated from Yale University in the class of 1890. He then became associated with his father and his uncle, William H. Sage, in the Sage Land and Development Company, which dealt in redwood timber lands on the Pacific Coast. At the time of his death he was president of the company.

As a young man he was much interested in outdoor sports and spent considerable time in the Carolinas and in Canada. He was a member of the Oakland Club of South Carolina, Canadian Fishing and Hunting clubs, and rode to hounds with the Landown Hunt Club.

Sage was elected to the New York Assembly in 1899 and to the State Senate in 1910, and was appointed chairman of the Senate Finance Committee in 1915 through the aid of Elon R. Brown, then president pro tem. of the Senate. While chairman he devised a new budget system. He was considered one of the most painstaking and hard-working members of the Legislature. In addition to his regular business and political activities, he served on the boards of the Albany Insurance Co., and the Albany Savings Bank, and was vice-president of the New York State Bank. He was a former trustee of Cornell University and later was connected with the State Hospital Commission.

Mr. Sage's publications were chiefly concerned with finance, but he issued a book of his poems which was distributed privately. Apparently, he published nothing especially on birds.—T. S. PALMER.

EDWARD SIDNEY SCHMID, an Associate of the American Ornithologists' Union, died of a heart ailment in Garfield Hospital, Washington, D. C., March 12, 1939, at the age of nearly eighty-three. He had been taken ill while on a vacation in Florida and reached home only a day before his death. He was born at Hastings-on-Hudson, New York, May 30, 1856, and two years later was brought by his parents to Washington which was to be his future home.

At the early age of twelve, intending to become a florist, he went to Leesburg, Virginia, to engage in floriculture but, due to failure of his father's health and the necessity of going to work to help support the family, he returned to Washington. Here he was engaged in making frames for floral designs and took up taxidermy as a hobby. Almost by accident he became interested in raising canaries and, finding that there was a real demand for them, he opened a pet shop. Later he moved to a new location at 712 12th St., where he established the 'Emporium of Pets' which, after the lapse of half a century, is still one of the institutions of the Capital. Here he built up a reputation for affability, fair dealing and ability to supply anything desired in the way of pets that attracted customers of high and low degree and made his name well known far beyond the confines of Washington. Among the prominent persons whom he numbered among his friends were Helen Keller and several presidents of the United States. Quentin Roosevelt was one of his frequent visitors and, through his interest and that of his brothers, Schmid began to supply pets for the White House. This service was also maintained during the McKinley and Coolidge administrations. Among the notable birds that passed through his shop was a Yellow-headed Amazon parrot that had been taught to sing and to repeat "Polly's worth \$500.00," an accomplishment that finally resulted in the sale of the bird for \$550.00.

Schmid was a true conservationist at heart and cheerfully acquiesced in the re-

strictions on the sale of native song birds following the enactment of the Lacey Act, but he never outgrew the feeling of hardship that he could no longer sell Mockingbirds and Cardinals as he did in former years. Elected an Associate of the Union in 1931, he resigned in 1933 but later withdrew his resignation and continued his membership until his death. He took a prominent part in fraternal activities and was a member of a number of local organizations and also of the Association of Oldest Inhabitants of the District of Columbia. He is buried in Rock Creek Church Cemetery, the resting place of several other Washington members of the Union.—T. S. PALMER.

JOHN WILLIAM STACEY, an Associate of the American Ornithologists' Union since 1942, passed away in San Francisco on October 16, 1943, at the age of seventy-two. Born at Galesburg, Michigan, on February 26, 1871, he later attended the University of Michigan at Ann Arbor where he studied medicine and botany. After graduating he went to Bellvue Hospital in New York for his internship. Instead of completing this, however, he became interested in the study of drugs and in editorial work for medical publications. In 1914, shortly after his marriage to Mrs. Florence Ward Waite, he came to San Francisco where he soon became head of the book department in one of the city's largest stores. In 1923 he founded his own scientific book company, the firm of J. W. Stacey, Inc., now well known in western North America.

Starting his career in the field of medicine and finishing it as a successful business man, John W. Stacey managed throughout his life to devote considerable time to botanical and ornithological pursuits. As a botanist he became an authority on sedges of the genus *Carex* and was responsible for the description of seven new species belonging to this group. On September 15, 1939, he was appointed Research Associate in Botany at the California Academy of Sciences. It was here that most of his scientific work had been carried on and his collections deposited. His bibliography, comprising seventeen separate publications, is purely botanical. Sixteen of these papers deal solely with problems relating to *Carex*.

Although he was always interested in birds, it was not until the later years of his life, when failing health prevented him from performing both confining business duties and detailed plant dissections in the laboratory, that he devoted his major efforts to bird study. He approached the subject of ornithology as a field observer, referring to museum skins only when it was necessary to settle dubious points. During these last few years he travelled many thousands of miles throughout the western states with his pair of binoculars as his constant companion. Although he failed to publish any bird papers during his life, he left, at the time of his death, a large number of carefully prepared manuscripts relating to his field observations. During his last year or so he devoted much of his energy to the preparation of a key to the birds of the state of Washington. This he hoped to make available ultimately as a useful guide to beginning bird students.

In addition to being an Associate of the American Ornithologists' Union and a Life Member of the California Academy of Sciences, John W. Stacey held membership in the Cooper Ornithological Club, the Wilson Ornithological Club, the Audubon Association of the Pacific, and the California Botanical Society. His passing is deeply regretted by his many friends and fellow associates in the business and scientific world.—ROBERT T. ORR.

MYRON FAYETTE WESTOVER, an Associate of the American Ornithologists' Union, died from heart disease at his home in Schenectady, New York, Oct. 21, 1933, at the

age of seventy-three. He was the son of William and Sarah (Covert) Westover and was born on a farm near Vinton, Iowa, July 10, 1860. He graduated from the law college of the University of Iowa and, after practicing law in Iowa a few years, became secretary to the president of the Thomson Houston Electric Company of Boston. In 1894 he was made secretary of the General Electric Company, a position which he held thirty-four years. He was particularly interested in administrative details relating to personnel, had charge of all insurance matters, and was largely responsible for the adoption by the company of the first group life insurance plan. He was much interested in geology and especially in the development of mines for mica, caesium, tungsten, and other minerals for which new needs were being developed. At the age of sixty-eight he retired from active business.

Mr. Westover was deeply interested in the out-of-doors and all that pertained to natural history in general. He traveled extensively in the West and wherever he went was interested in local history. His association with the A. O. U. was unfortunately very brief. Elected at the Quebec meeting in 1932, he died a year later. At this meeting was shown a short motion-picture film he had made on the Chimney Swift demonstrating that the flight of the bird is accomplished by simultaneous instead of alternate beats of the wings as some observers had supposed.

In addition to holding membership in the Union, Mr. Westover was a member of the Campfire Club of America, the Adirondack Mountain Club, the Appalachian Mountain Club, the New York State Historical Society, the Schenectady Chamber of Commerce, and other organizations. He was survived by his widow and a son, Wendell Westover.—T. S. PALMER.

SAMUEL WELLS WILLARD, an Associate of the American Ornithologists' Union, elected at the first meeting in 1883, died at Chattanooga, Tennessee, May 24, 1887, at the age of twenty-eight. No notice of his work having been published, it seems desirable, even at this late date, to place on record a brief statement regarding his activities. He was born May 21, 1859, and in 1875 accompanied his parents from Cleveland, Ohio, to De Pere, Wisconsin, where he carried on observation of birds and made notes on bird migration. He was a contemporary of F. H. King and Ludwig Kumlien.

In 1884 he was one of Prof. W. W. Cooke's observers on bird migration. In 1885 he published in the 'Transactions of the Wisconsin Academy of Science, Art, and Literature' a twenty-page paper on migration and distribution, containing an annotated list of 210 species of birds of Brown and Ontonagon counties in east-central Wisconsin, just west of the southern end of Green Bay. He also contributed to the 'Bulletin of the Nuttall Ornithological Club' notes on eagles attempting rescue of a wounded companion and on the occurrence of the Velvet Scoter at Green Bay. His contributions to 'The Auk' included notes on the migration of winter birds in 1884, food of the Hummingbird and occurrence of Franklin's Gull near the mouth of Fox River, Wisconsin, in 1885, and the Evening Grosbeak at De Pere in 1886.

Willard was described as a young man of unusual promise and, had his career not been cut short at an early age, he probably would have made an outstanding record in ornithological work.—T. S. PALMER.

THE AUK

A Quarterly Journal of Ornithology
ORGAN OF THE AMERICAN ORNITHOLOGISTS' UNION

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THE AUK
VOLUMES 48-57 1931-1940

Prepared by

H. S. SWARTH and GEORGE WILLETT

Edited by

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